Twelfth Annual Sentinel Initiative Public Workshop

Wednesday, October 14th

1:00 p.m. – 4:00 p.m. ET

Welcome and Overview

Mark McClellan

Duke-Margolis Center for Health Policy

Virtual Meeting Reminders

- Visit the Duke-Margolis website (https://healthpolicy.duke.edu/events) for meeting materials, including the agenda, speaker biographies, and discussion topics.

- Questions for our panelists? Feel free to submit questions via email to MargolisEvents@duke.edu or through Slido.

- Join the conversation @Duke-Margolis #sentinelinitiative

Keynote Address

Patrizia Cavazzoni

U.S. Food and Drug Administration

Session I: A Robust Sentinel System for the 21st Century

1:20 pm – 1:50 pm

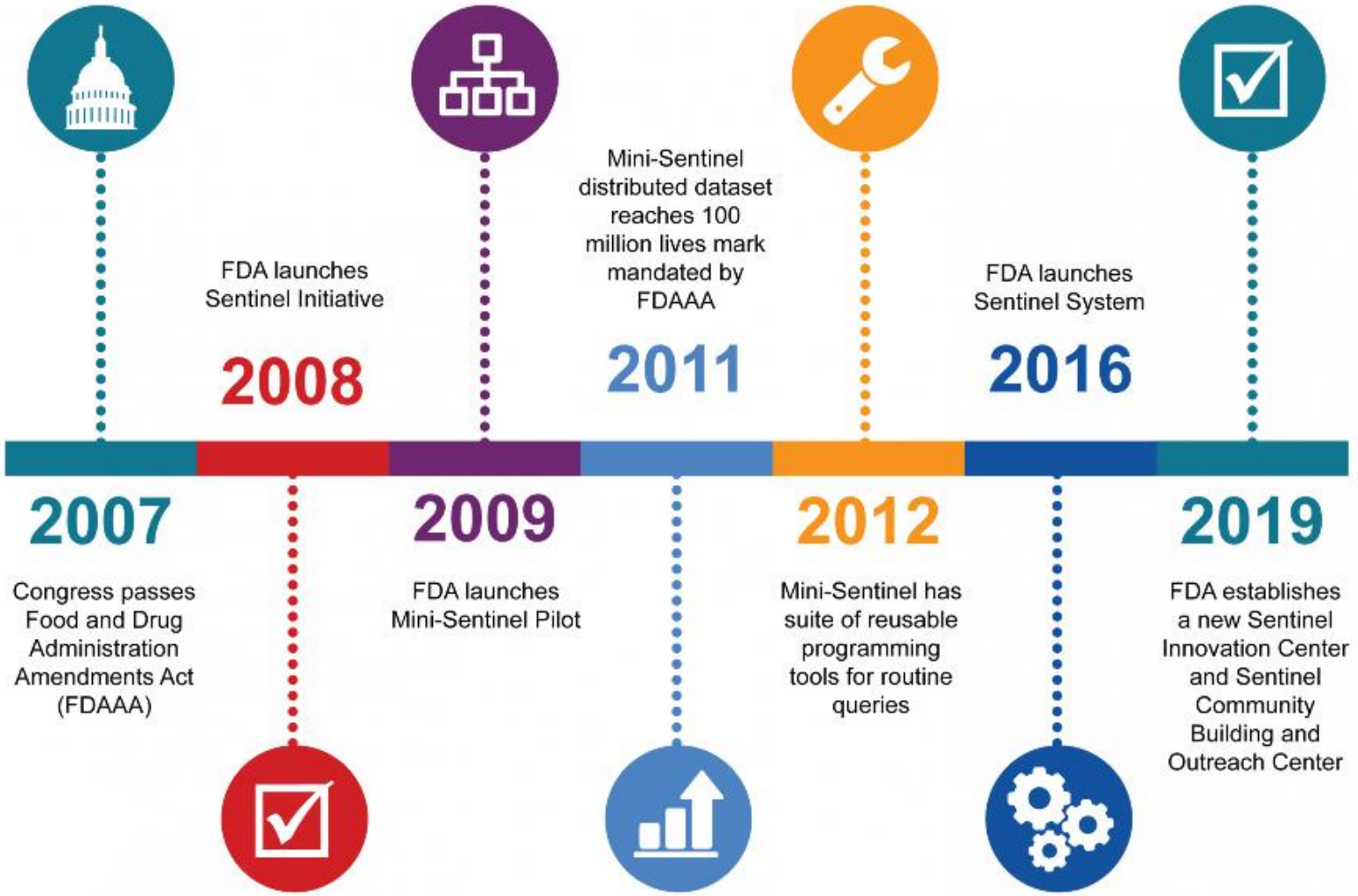
Robert Ball

U.S. Food and Drug Administration

Update on the Sentinel System

Robert Ball, MD, MPH, ScM
Deputy Director
Office of Surveillance and Epidemiology
Center of Drug Evaluation and Research
October 14, 2020

History of the Sentinel Initiative



From strategic plan to new Sentinel System structure

The Future of FDA's Electronic Safety Surveillance

SHARE | TWEET | LINKEDIN | PIN IT | EMAIL | PRINT

By: Scott Gottlieb, M.D., and Gerald Dal Pan, M.D., MHS

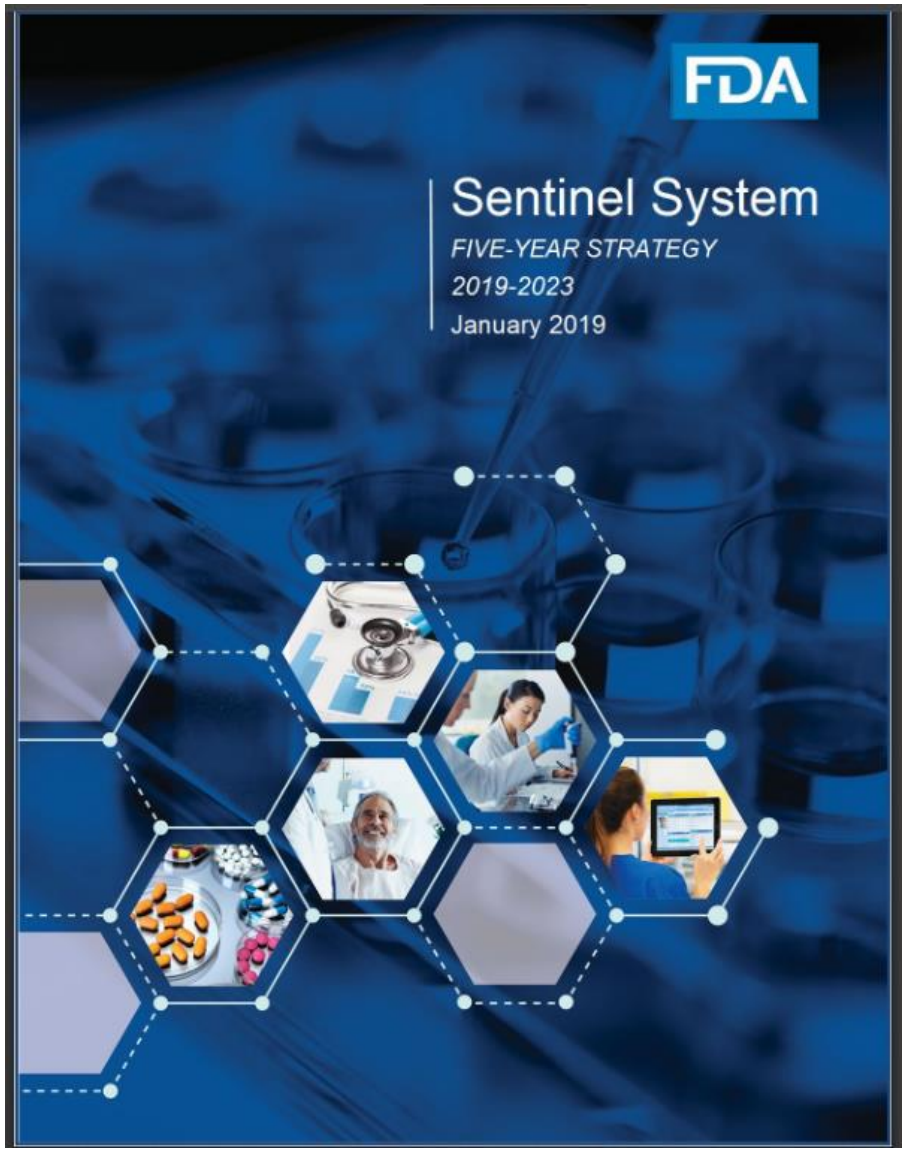
Scott Gottlieb, M.D., Commissioner of Food and Drugs

The U.S. Food and Drug Administration (FDA) is an information-driven agency that requires robust data to make regulatory decisions. One of our key obligations is to analyze large quantities of data related to the safety and effectiveness of medical products; and turn these signals into information that can help patients and providers make more informed decisions. Maximizing the benefits of today's sophisticated arsenal of FDA-approved medical products requires an equally advanced set of tools for collecting this data, and evaluating it, as a way to monitor and inform about the safety of these new innovations. One of the most important of those tools that we use to advance these efforts is large-scale electronic safety surveillance: the ability to access and analyze data across millions of patient experiences with the medical products they use – while protecting the privacy of individual health care records.

A little more than a decade ago, such a wide-reaching electronic resource was just an idea among visionary thought leaders. Today, it's become a reality as a national electronic system for monitoring the safety of FDA-approved drugs and other medical products called the Sentinel System. That development of that system was a watershed achievement. We're now looking for new ways to build on this robust tool, to develop an even better generation of tools for using data to improve safety.

Sentinel has become an integral part of FDA's safety monitoring efforts. It's a critical engine for methodological innovation, and a platform to advance the science of real world evidence (RWE).

Prior to the implementation of Sentinel, for many years, FDA's primary source of medical product safety data came from adverse event reports from patients, health care professionals, the pharmaceutical industry, and others. These reports, collectively part of a "passive surveillance" system in FDA's Adverse Event Reporting System (FAERS), still serve a critical purpose for safety researchers. However, the "active surveillance" capabilities of Sentinel are an extremely important complement to FAERS data. Instead of waiting to receive safety data, it enables FDA to go out and

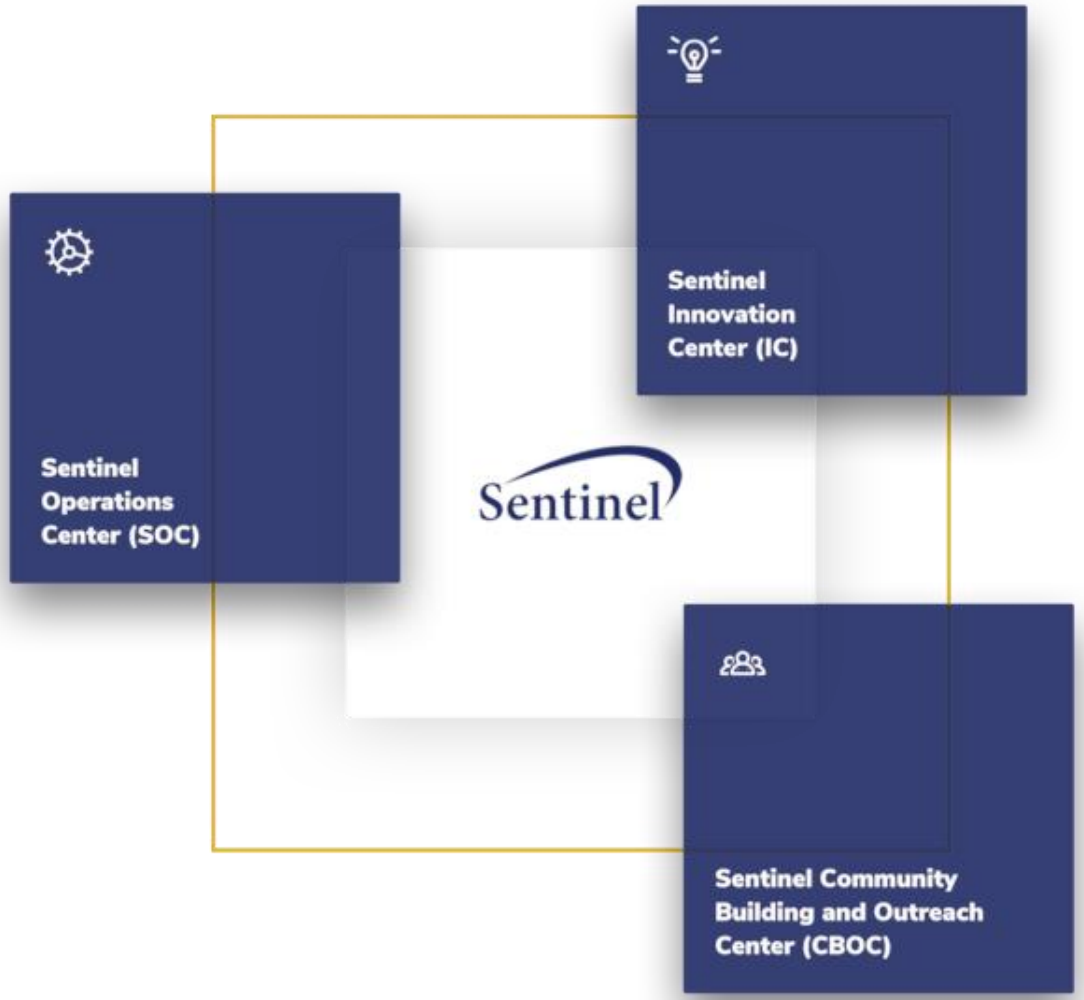


Key Messages from Strategic Plan

- Maintain and enhance the foundation of the Sentinel System, preserving FDA's long term investment in Sentinel's analysis tools and data infrastructure
- Diversify data sources, especially EHRs and claims linked to EHR's
- Incorporate advanced analytics
- Broaden touch points for participating in Sentinel's development
- Establish a Sentinel scientific community and disseminate knowledge to improve public health

New Sentinel System Structure

Conduct analyses and Enhance the Infrastructure



Advance the Science

Engage the Community

Thank You

Richard Platt

Harvard Pilgrim Health Care Institute

The FDA Sentinel Operations Center

Richard Platt

For the Sentinel Team

October 14, 2020

Four Areas of Progress in 2020

- Support of FDA
- Creating a national resource
- Bringing EHR data into Sentinel
- Adopting additional advanced analytics

Support of FDA

Operations Center Collaborating Organizations

Sentinel

Lead – HPHC Institute

DEPARTMENT OF POPULATION MEDICINE
HARVARD MEDICAL SCHOOL
Harvard Pilgrim Health Care Institute

Data & Scientific Partners

Blue Cross Blue Shield Massachusetts
HealthCore Anthem
HCA Healthcare
health care systems research network
Department of Population Health Sciences, Duke University School of Medicine
Vanderbilt School of Medicine
OPTUM
HUMANA
Kaiser Permanente
aetna

Scientific Partners

Penn Medicine
Harvard T.H. Chan School of Public Health
Department of Medicine, Brigham and Women's Hospital, Harvard Medical School
UNC Gillings School of Global Public Health
The University of Iowa College of Public Health
IQVIA
AHIP America's Health Insurance Plans
UF College of Pharmacy, University of Florida
UIC
UAB
Rutgers

https://www.sentinelinitiative.org/collaborators

Operations Center Collaborating Organizations

Sentinel

Lead: Harvard Pilgrim Health Care Institute

DEPARTMENT OF POPULATION MEDICINE
HARVARD MEDICAL SCHOOL
Harvard Pilgrim Health Care Institute

Data & Scientific Partners

HealthCore
Anthem
Humana
OPTUM
TennCare
RTI International
veradigm
Penn Medicine
Healthagen
aetna
GDIT
OPTUM Labs
pcornet
ADVANCE Collaborative
Massachusetts
Brigham Health
BWH Brigham and Women's Hospital
Kaiser Permanente
Colorado
Hawaii
Mid-Atlantic
Northern California
Northwest
Washington
CMS Centers for Medicare & Medicaid Services
CAPriCORN
GPC Greater Plains Collaborative
Booz | Allen | Hamilton
Marshfield Clinic Research Institute
Harvard T.H. Chan School of Public Health
Rutgers
NYC-CDRN New York City Clinical Data Research Network
UF College of Pharmacy University of Florida
Vanderbilt University Medical Center
The Meyers Primary Care Institute
Kaiser Permanente Washington Health Research Institute
OneFlorida Clinical Research Consortium
REACHnet Research Action for Health Network
IBM Watson Health
PaTH Network patient empowered research
PEDSnet A Pediatric Learning Health System
HealthPartners Institute
School of Public Health University of Washington
UAB
HCA Healthcare
UNC Gillings School of Global Public Health
STAR Stakeholders, Technology, and Research CRN
Duke Clinical Research Institute
The University of Iowa College of Public Health
TriNetX

The Sentinel Distributed Database

- **788 million** person-years of data
- **71 million** people currently accruing new data
- **14 billion** medical encounters
- **15 billion** pharmacy dispensings
- **43 million** with at least one laboratory test result
- **5 million** linked mother-baby pairs

Selected Regulatory Outcomes

Sentinel

Anesthetic and Analgesic Drug Products Advisory Committee
Opioid analgesics & Duration of Use
November 15, 2018

Endocrinologic and Metabolic Drugs Advisory Committee
SGLT-2 Inhibitors & Diabetic Ketoacidosis
January 17, 2019

Drug Safety and Risk Management Advisory Committee and the Anesthetic and Analgesic Drug Products Advisory Committee
Oral and Transmucosal Opioid Analgesics
June 11, 2019

Drug Safety Communication
Boxed Warning about Serious Mental Health Side Effects for Singulair
March 4, 2020

2018 | 2019 | 2020

Continuation of Sponsor Postmarket Requirement
Teriparatide & Duration of Use
November 30, 2018

Arthritis Advisory Committee and Drug Safety and Risk Management Advisory Committee
Urate-Lowering Therapies and Gout
January 11, 2019

GAO Report to Congressional Committees
Anti-Obesity Medications
August 2019

Pediatric Advisory Committee and the Drug Safety and Risk Management Advisory Committee
Singulair and Neuropsychiatric Events
September 27, 2019

Label Change
Non-Melanoma Skin Cancer Following Hydrochlorothiazide Use
April 2020

International Collaborations

Sentinel

CNODES
CANADIAN NETWORK FOR OBSERVATIONAL DRUG EFFECT STUDIES

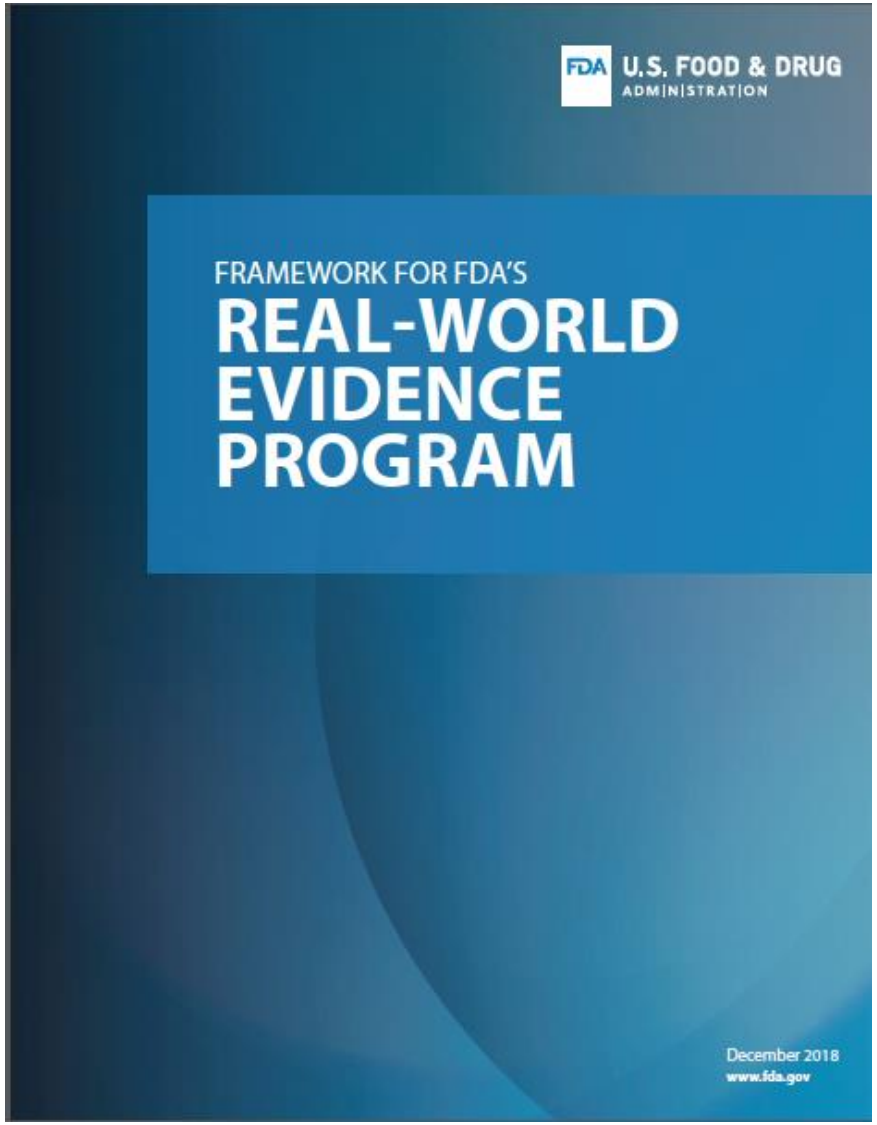
CPRD
UK data driving real-world evidence

COPENHAGEN HEALTHTECH CLUSTER

Danish National Patient Register

Sentinel in FDA's Real World Evidence Framework

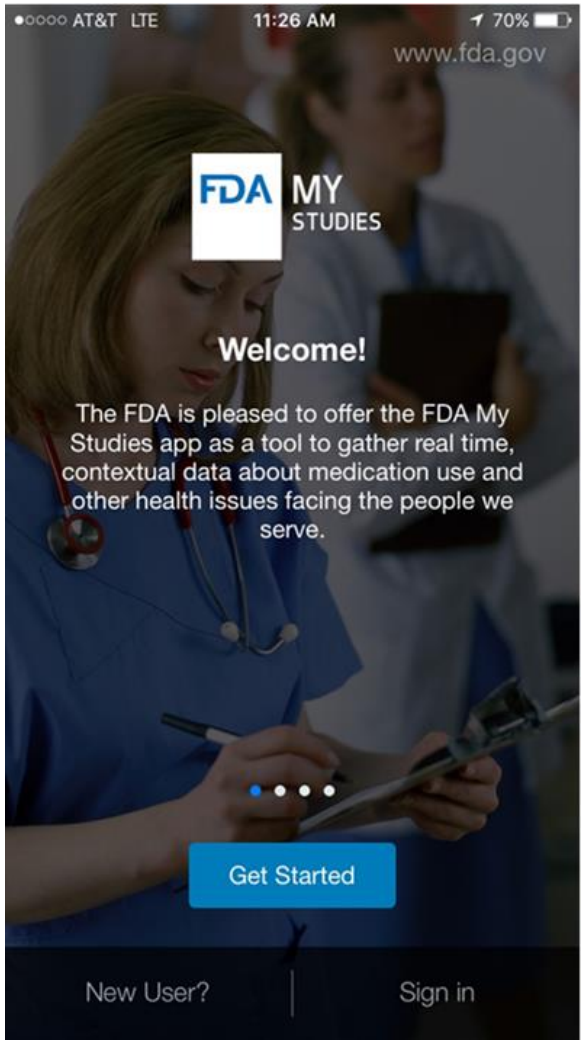
- "FDA has a long history of using RWE to monitor and evaluate the safety of drug products… FDA's primary source for executing pharmacoepidemiologic queries and studies is electronic health data … in the Sentinel System…"



www.fda.gov/downloads/ScienceResearch/SpecialTopics/RealWorldEvidence/UCM627769.pdf , page 8

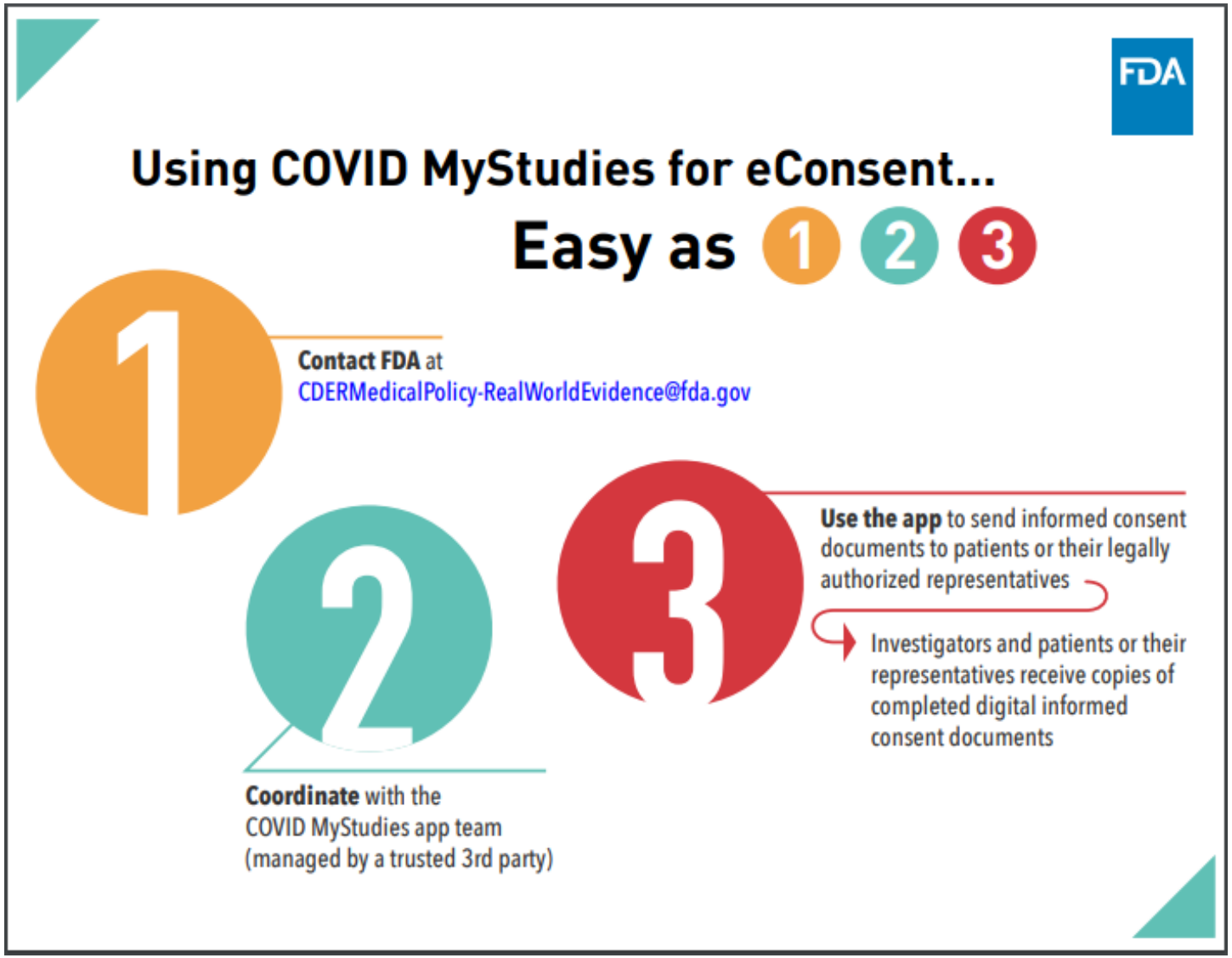
My Studies Mobile App

- Link primary data from patients (or other reporters such as healthcare professionals) to secondary electronic health data
- Complements existing national infrastructure but may also be linked to studies outside of FDA Sentinel, the NIH Collaboratory, and PCORnet
- Potential uses
  - Pragmatic Trials
    - Consent
    - Patient Reported Outcomes
  - Observational Studies (e.g., virtual registries for rare diseases)



Real World Data / Real World Evidence

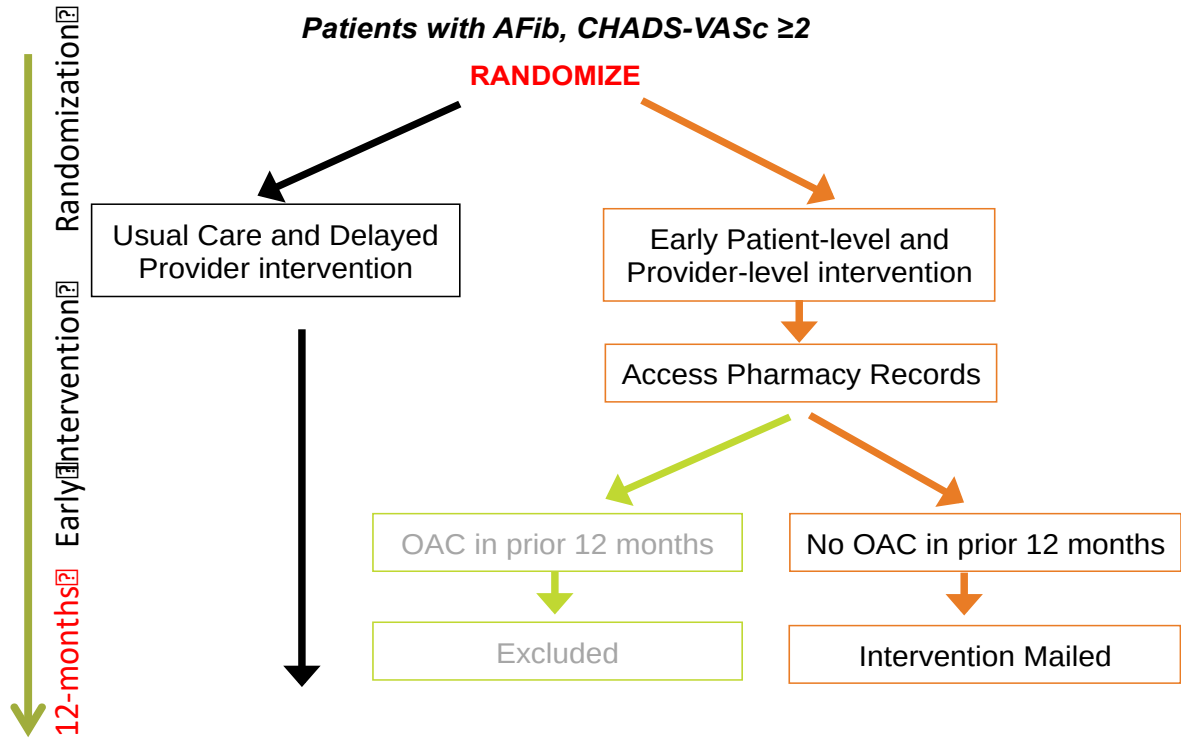
- MyStudies App



Pragmatic Trial in Sentinel – IMPACT AFib

IMplementation of a randomized controlled trial to im**P**rove treatment with oral **A**nti**C**oagulan**T**s in patients with **A**trial **Fib**rillation

- Direct mailer to health plan members with AFib, high risk for stroke and no oral anticoagulant (OAC) treatment, and to their providers, to encourage consideration of OACs
- 80,000 individuals randomized in 5 health plans
- Trial successfully completed



https://www.sentinelinitiative.org/FDA-catalyst/projects/implementation-randomized-controlled-trial-improve-treatment-oral-anticoagulants-patients

Sentinel Support for Pandemic Preparedness

- Pandemic preparedness
- Address confounding in observational studies of influenza antiviral effectiveness
- Assess impact of timeliness of antiviral treatment on complications of influenza

Sentinel As A National Resource

National Collaborations

Sentinel

REAGAN-UDALL FOUNDATION FOR THE FOOD AND DRUG ADMINISTRATION

CDC CENTERS FOR DISEASE CONTROL AND PREVENTION

BBCIC Biologics & Biosimilars Collective Intelligence Consortium

Bringing EHRs into Sentinel

Current EHR partners

Sentinel

HCA Healthcare℠

IBM Watson Health

pcornet

veradigm®

TriNetX

Adopting additional advanced analytics

Takeaways for 2020

- New partnerships
- New data sources – focus on EHRs
- New analytic methods
- Enhanced ability to rapidly analyze extensively quality checked data
- Enhanced ability to recommend and apply highest quality epidemiologic methods to assess causal relationships

Thank you

Sebastian Schneeweiss

Brigham and Women's Hospital and Harvard Medical School

Sentinel Innovation Center

Introduction and Master Plan

Sebastian Schneeweiss, MD, ScD

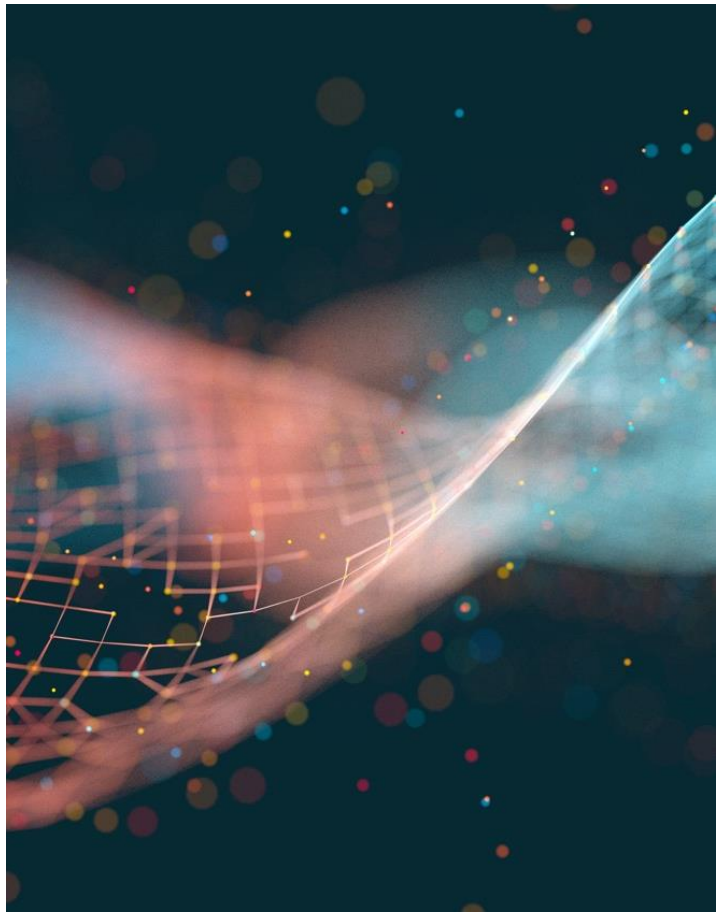
Executive Director, Sentinel Innovation Center

Sentinel

October 14, 2020

Mission

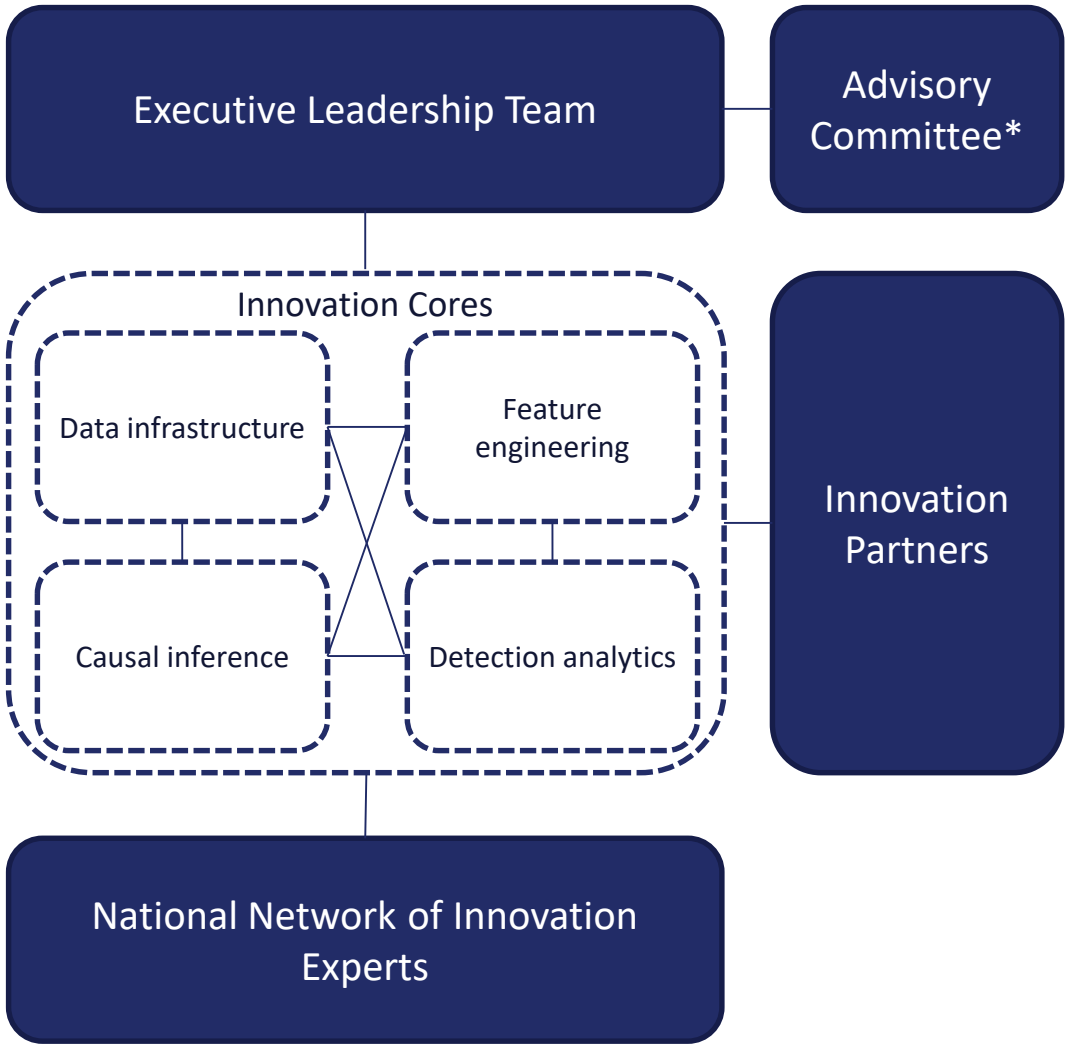
Improve human health by expanding Sentinel's Active Risk Identification and Analysis (ARIA) capabilities to effectively use electronic health care data sources for drug safety surveillance and increase confidence in and use of real-world data for regulatory decision-making.



Vision

Establish a query-ready, quality-checked, distributed data network containing electronic health records with reusable analysis tools.

Structure



*IC Advisory Committee is not an official FDA Advisory Committee

Executive Leadership Team

Sebastian Schneeweiss, MD, ScD
Brigham and Women's Hospital, Harvard Medical School

Joshua Gagne, PharmD, ScD
Brigham and Women's Hospital, Harvard Medical School

Lesley Curtis, PhD
Duke Clinical Research Institute, Duke University

Keith Marsolo, PhD
Duke Clinical Research Institute, Duke University

Jennifer Nelson, PhD
Kaiser Permanente Washington Health Research Institute

Patrick Heagerty, PhD
University of Washington

Kevin Johnson, MD, MS
Vanderbilt University Medical Center

Michael Matheny, MD, MS, MPH
Vanderbilt University Medical Center

Collaborating organizations

Master Plan framework

Strategic priorities

- Establishing data infrastructure
- Expanding feature engineering
- Enhancing causal inference
- Advancing detection analytics

Goals

- Each strategic priority has a set of defined goals

Initiatives

- 21 initiatives
  - 11 initial projects
  - 10 future projects

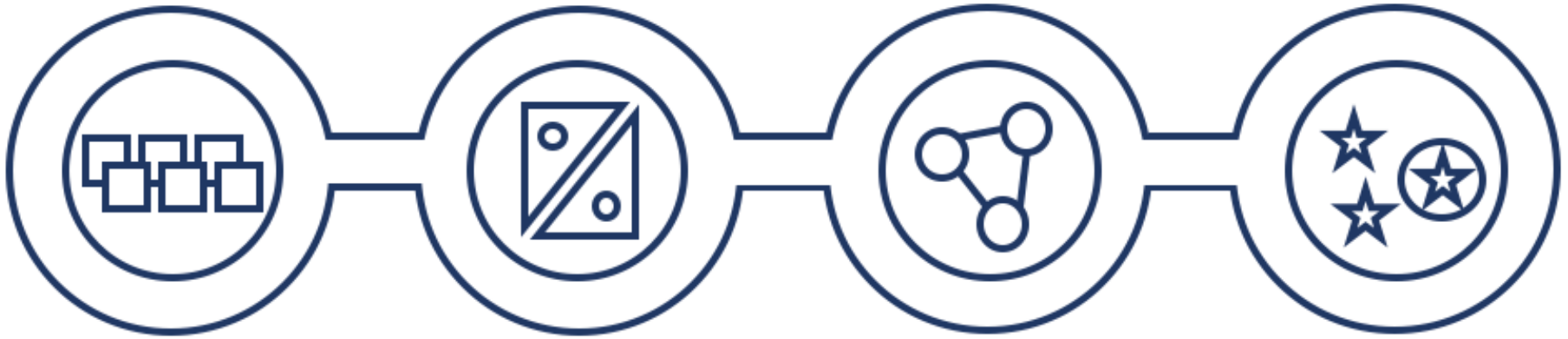
Outputs

- Projects deliverables are the building blocks for the query-ready, quality-checked, distributed data network containing health records with reusable analysis tools

Vision

- Query-ready, quality-checked, distributed data network containing health records with reusable analysis tools

Strategic priorities and topic areas



Data infrastructure

- Data partners
- Data elements
- Governance
- Harmonization
- Data quality assurance

Feature engineering

- Natural language processing
- Automated feature extraction
- Computable phenotyping

Causal inference

- Target trial design
- Advanced, semi-automated analytics
- Subset calibration
- Distributed methods

Detection analytics

- Methodological framework
- Statistical methods
- Cancer outcomes
- Pregnancy and birth outcomes

Example Master Plan initiatives

Horizon scan of electronic health record databases	
Strategic priority area	Establishing data infrastructure
What this project adds	This project will lead to the identification of the most promising electronic record databases for incorporation into Sentinel and an understanding of the organizations' data and capabilities.

Enhancing causal inference in the Sentinel system: an evaluation of targeted learning and propensity scores for confounding control in drug safety	
Strategic priority area	Enhancing causal inference
What this project adds	This project will determine whether advanced machine learning methods and structured and unstructured electronic health record data can improve confounding control as compared to traditional propensity score analysis of claims data.

Thank You

Asif Dhar

Deloitte LLP

The CBOC Within the Broader Sentinel Structure

The three distinct centers within the Sentinel Initiative collaborate to advance regulatory science using the Sentinel System.

The CBOC aims to deepen stakeholder involvement and broaden awareness of and access to Sentinel tools and data infrastructure.

The proposed primary functions of the CBOC are to:

- Modernize the Sentinel website to enhance user experience and key functionalities
- Catalyze breakthrough ideas in regulatory science through scientific challenges
- Accelerate the use of the Sentinel Common Data Model and analytic tools for uses beyond drug safety

The CBOC Master Plan

The CBOC Master Plan will:

- Define what it means for Sentinel to be a **national and global analytics resource** for each of the stakeholder groups to the right
- Outline a **series of projects** and initiatives for the CBOC to carry out over the next five years to achieve the CBOC's Strategic Priorities
- Detail a **plan for implementing** a select group of these projects

Stakeholder Groups

- Academia
- FDA
- Industry
- Informatics Community
- International Regulatory Agencies
- US Health Agencies
- Patient Advocacy Organizations

The CBOC is developing the Master Plan in five steps:

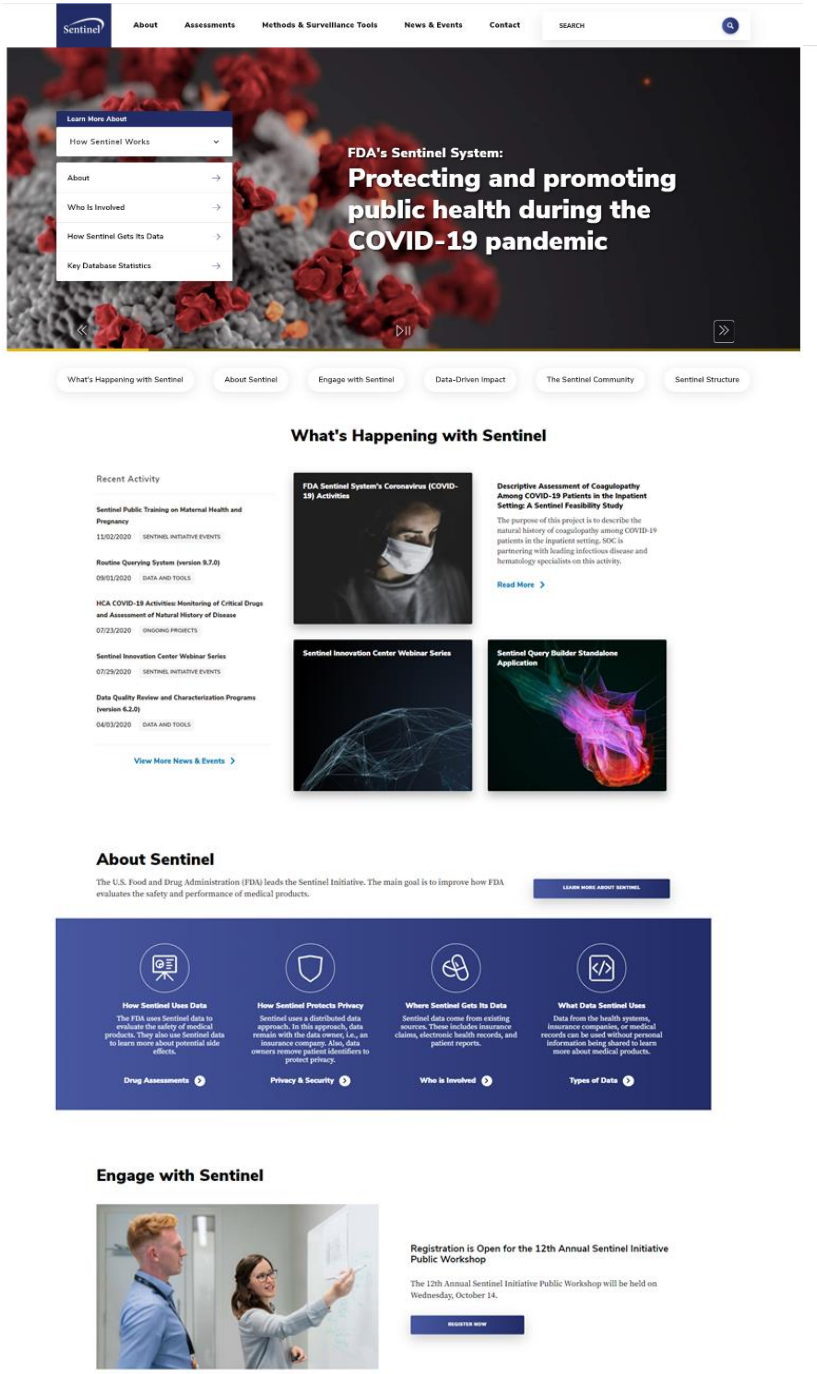
The Sentinel Website Redesign

Since January 2020, the CBOC Website team has fully redesigned the Sentinel Initiative website in collaboration with FDA, SOC, & IC:

- **Identified user needs and pain points** through extensive discussions with the Sentinel community and two rounds of usability testing
- Fully re-designed the home page to **highlight key information, simplify messaging, and provide a billboard** for Sentinel and it's impact on public health
- **Re-organized the navigation** to improve findability and streamline content
- Resolved severe usability issues and **implemented a new, standardized table search**, sort, & filter experience
- Designed & developed new features to aggregate content, **improve user experience**, and support future growth

1,000+
Redesigned/
Improved pages

~40 hrs
User research &
usability testing



Session I — Audience Q&A

A Robust Sentinel System for the 21st Century

Session II: Building the BEST Network and Establishing New Capabilities for the Surveillance of Biologics

1:50 pm – 2:20 pm

Hui-Lee Wong

U.S. Food and Drug Administration

FDA U.S. FOOD & DRUG ADMINISTRATION

12th Sentinel Initiative Public Workshop:

CBER Surveillance Program:

Biologic Effectiveness and SafeTy (BEST) Initiative Update

Presented by:

Hui-Lee Wong, PhD

Office of Biostatistics and Epidemiology
Center for Biologics Evaluation and Research
U.S. Food and Drug Administration

The views expressed in this presentation are those of the presenter and do not necessarily reflect those of the FDA

CBER Surveillance Program

FDA CBER Mission Focus

Ensure biologic-product safety and effectiveness

CBER Surveillance Program's Vision

To create and utilize an effective national post-market surveillance system for CBER-regulated products to provide data for evidence-based regulatory decisions.

CBER-Regulated Products

- Vaccines (preventative and therapeutic)
- Blood (components and derived)
- Human Tissues and Cellular Products
- Gene Therapies
- Xenotransplantation Products

CBER Surveillance Program Priorities

1. **Pandemic preparedness**
2. **Emerging infectious diseases and their geographic distribution**
3. **Capability to evaluate new products**
   - Rapid cycle analysis for new vaccines and blood products
4. **Safety of vaccines in pregnancy**
5. **Developing improved infrastructure for hemovigilance**
   - Safety evaluation of blood components and products with respect to specific adverse events

CBER Surveillance Program Collaborative

Through multiple contracts and partnerships, CBER works with a diverse group of epidemiologists, data scientists and clinical experts to conduct active surveillance studies.

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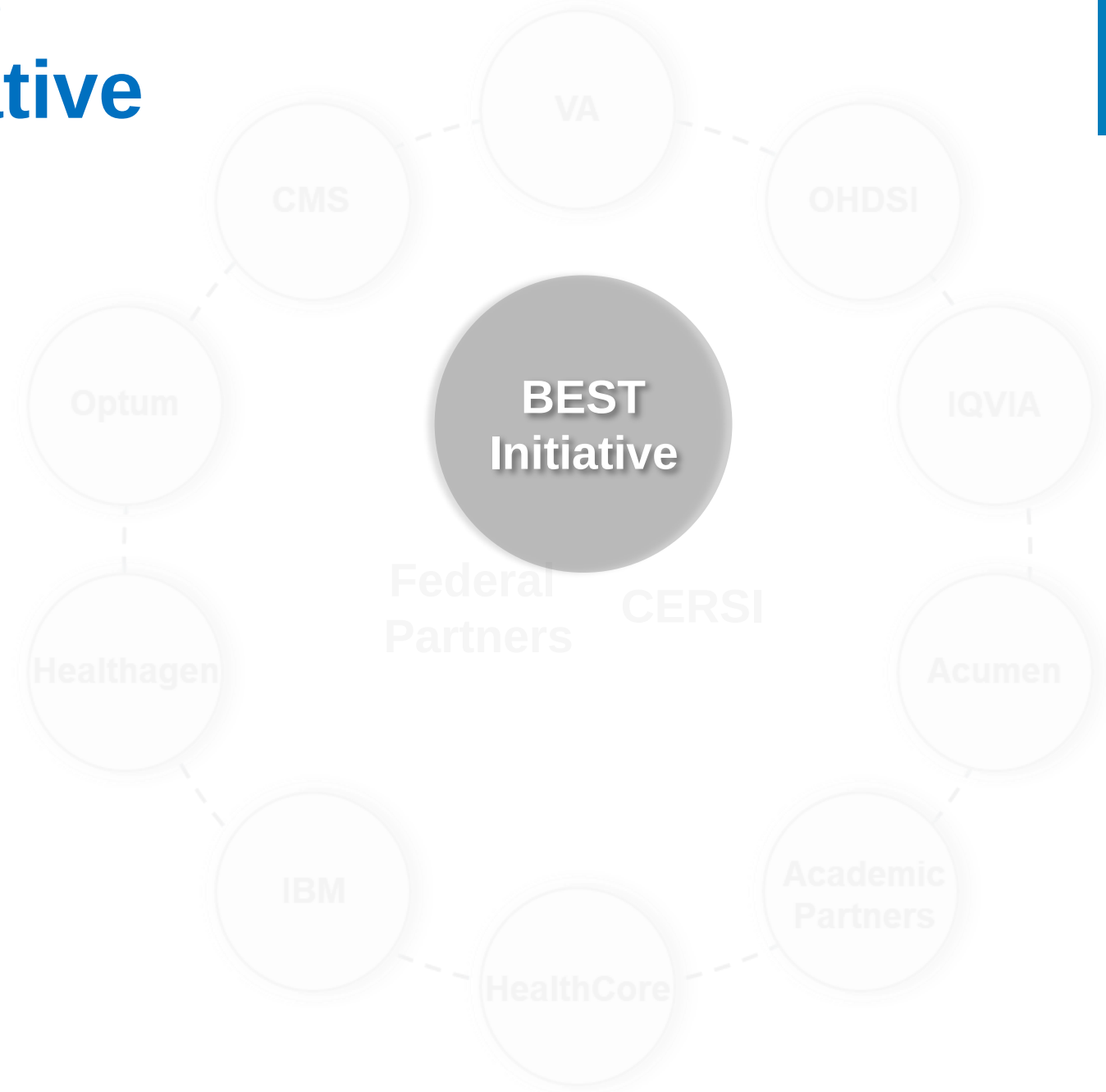

2019-2020 Updates and Accomplishments

- BEST Initiative Expansion
- Algorithm Development and Validation Studies
- Blood Component Utilization Studies
- Blood Derived Products

2019-2020 Updates and Accomplishments

- **BEST Initiative Expansion**
- **Algorithm Development and Validation Studies**
- **Blood Component Utilization Studies**
- **Blood Derived Products**

BEST Initiative Expansion

Data Sources

Data Sources	Type	Patients (millions)
MarketScan	Claims	254
Blue Health Intelligence	Claims	33.6
Optum	Claims	70
HealthCore	Claims	56
Healthagen	Claims	26
OneFlorida Clinical Research Consortium (Medicaid)	Claims	6.7

Data lag: 1-12 months depending on data source

BEST Initiative Expansion

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BEST Initiative Expansion

Data Sources

Data Sources	Type	Patients (millions)
MedStar Health	EHR	6
IBM Explorys	EHR	90
Regenstrief Institute	Claims and EHR	20.2
Columbia University	EHR	6.6
University of Colorado	EHR	17
University of California San Francisco	EHR	3.2
PEDSnet Clinical Research Consortium	EHR	6.2
Optum EHR	EHR	105
OneFlorida Clinical Research Consortium	EHR	5.6
OneFlorida Clinical Research Consortium	Linked EHR-Claims	1.5
MarketScan Explorys Claims-EHR (CED)	Linked EHR-Claims	5.5
Optum	Linked EHR-Claims	85

Data lag: 1-2 weeks to 4 months depending on data source

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BEST Initiative Expansion

Community Engagement

Community Engagement and Development Initiative (CEDI)

Objectives:

- To convene meetings and workshops;
- To coordinate or conduct methods development activities;
- To conduct training and outreach to educate CBER staff and external stakeholders.

OHDSI

2019-2020 Updates and Accomplishments

- BEST Initiative Expansion
- **Algorithm Development and Validation Studies**
- Blood Component Utilization Studies
- Blood Derived Products

Algorithm Development

Health Outcomes of Interest

Study Aim: To develop ICD-10 coding algorithms for safety surveillance of health outcomes relevant for biologic exposure

Health Outcomes of Interest:

On-going HOI Development	Completed HOI Development
Acute Bronchitis	Syncope
COPD Exacerbation	Thromboembolic Events
Pneumonia	Diabetes
Acute Respiratory Distress Syndrome (ARDS)	Pregnancy Outcomes
Bell's Palsy	Hemolysis
Febrile Seizures	
Encephalitis	
Hemophilia A	

IBM Acumen

Algorithm Development

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Encephalitis	
Hemophilia A	

IBM Acumen

Validating Pregnancy Outcomes & Gestational Age

Study Aims:

- To develop ICD-10-based algorithms for pregnancy outcome and gestational age
- To validate with clinical elements mapped to GAIA definitions in linked claims-EHRs

Study Population: Women aged 12-55 years

Time Period: August 1, 2016 – October 31, 2018

Data Sources: MarketScan Explorys Claims-EHR (Linked EHR-Claims)

IBM

Validating Pregnancy Outcomes & Gestational Age

Algorithm Performance- Gestational Age Estimation

Gestational age	Percentage Positive Agreement Point Estimate* +/-7 days (95% Confidence Interval)
Live birth	**83.8** (77.6–88.5)
Full-term live birth	**85.9** (77.0–91.8)
Preterm live birth	**81.7** (72.4–88.5)
Spontaneous abortion	**61.3** (49.8–71.7)
Stillbirth	**66.7** (46.2–82.4)

*agreement between algorithm-estimated and physician-adjudicated gestational age

Validating Pregnancy Outcomes & Gestational Age

Algorithm Performance - Pregnancy Outcome Identification

	Total	
	Adjudicated with GAIA levels 1–3 certainty	**Percentage positive agreement (PPA)**
	N	**Point Estimate** (95% Confidence Interval)
Outcomes		
Live birth	185	**100.0** (97.5–100.0)
Full-term live birth	92	**97.8** (91.8–99.9)
Preterm live birth	93	**62.4** (52.0–71.7)
Stillbirth	24	**70.8** (50.2–85.5)
Spontaneous abortion	75	**100.0** (93.9–100.0)

IBM

Vaccine Exposure During Pregnancy

Study Aim: To examine the prevalence and timing of exposure to vaccines during pregnancy in the United States.

Study Population: Women aged 12-55 years

Time Period: August 2016 - December 2018

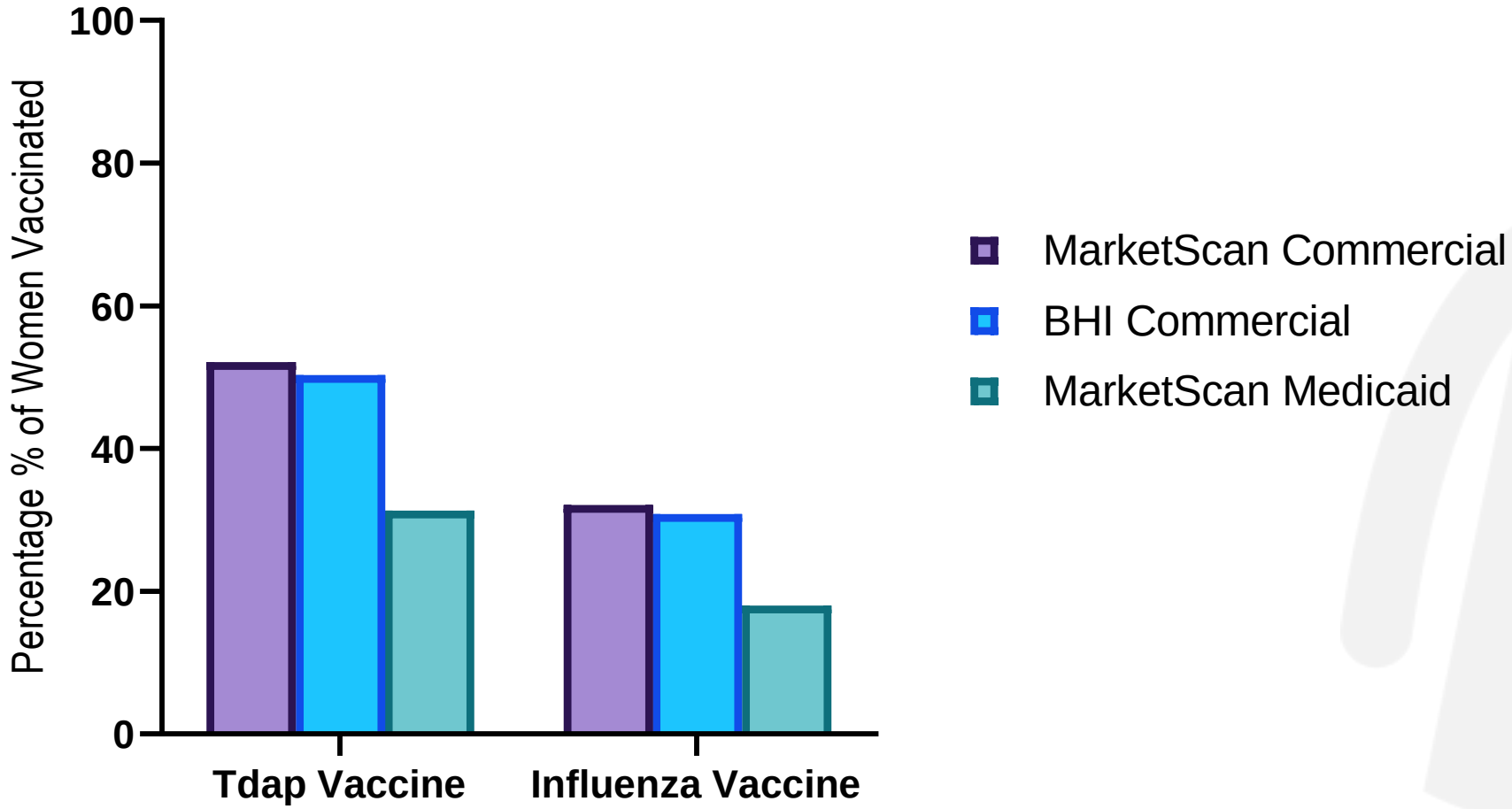
Data Sources: MarketScan, Blue Health Intelligence, Medicaid

IBM Acumen

Vaccine Exposure During Pregnancy

Results

Exposure to Vaccines Recommend During Pregnancy



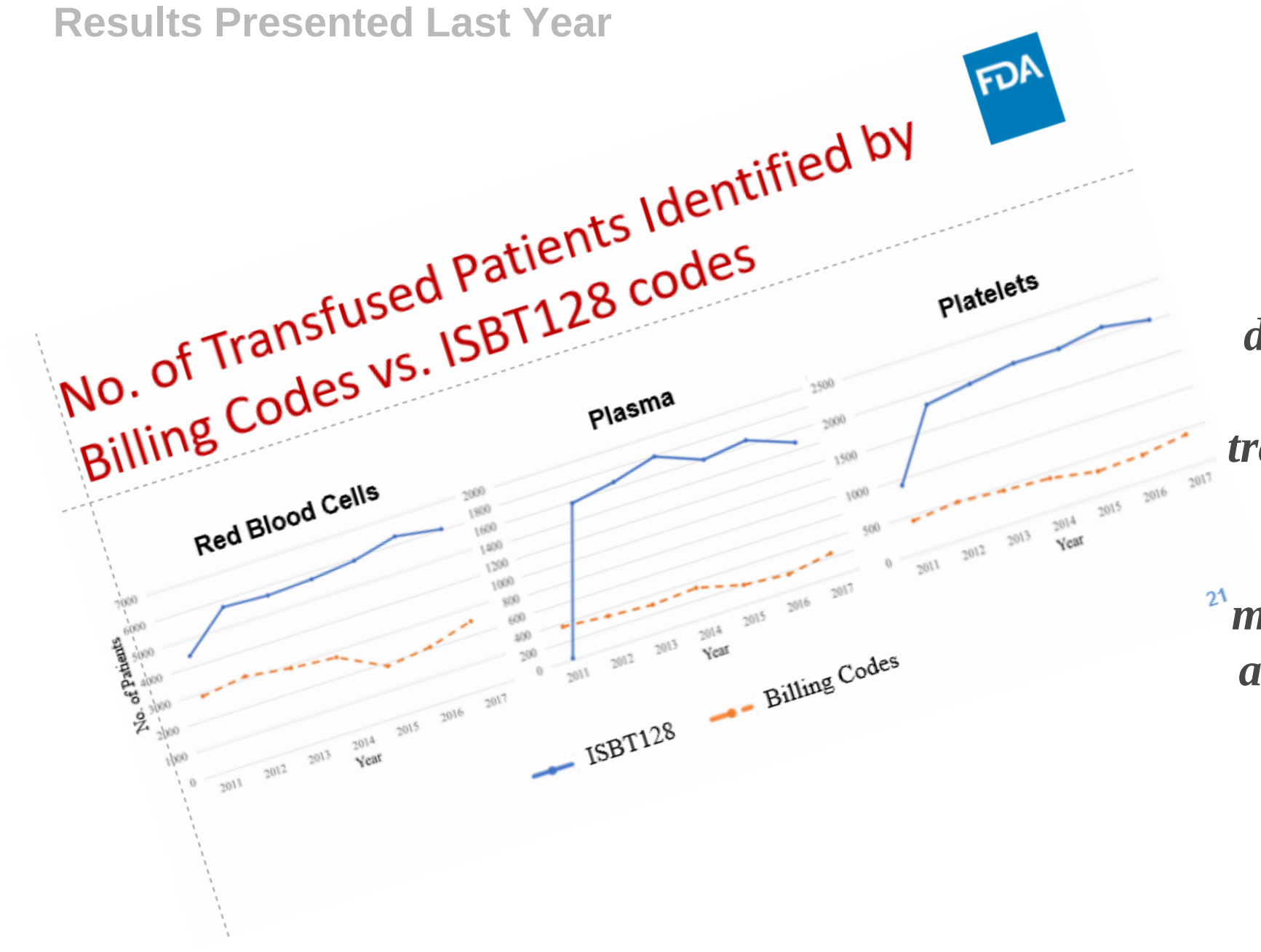
Abbreviations: BHI = Blue Health Intelligence; Tdap = tetanus, diphtheria, and acellular pertussis ; HPV = human papillomavirus; MMR = measles, mumps, rubella.

2019-2020 Updates and Accomplishments

- BEST Initiative Expansion
- Algorithm Development and Validation Studies
- **Blood Component Utilization Studies**
- Blood Derived Products

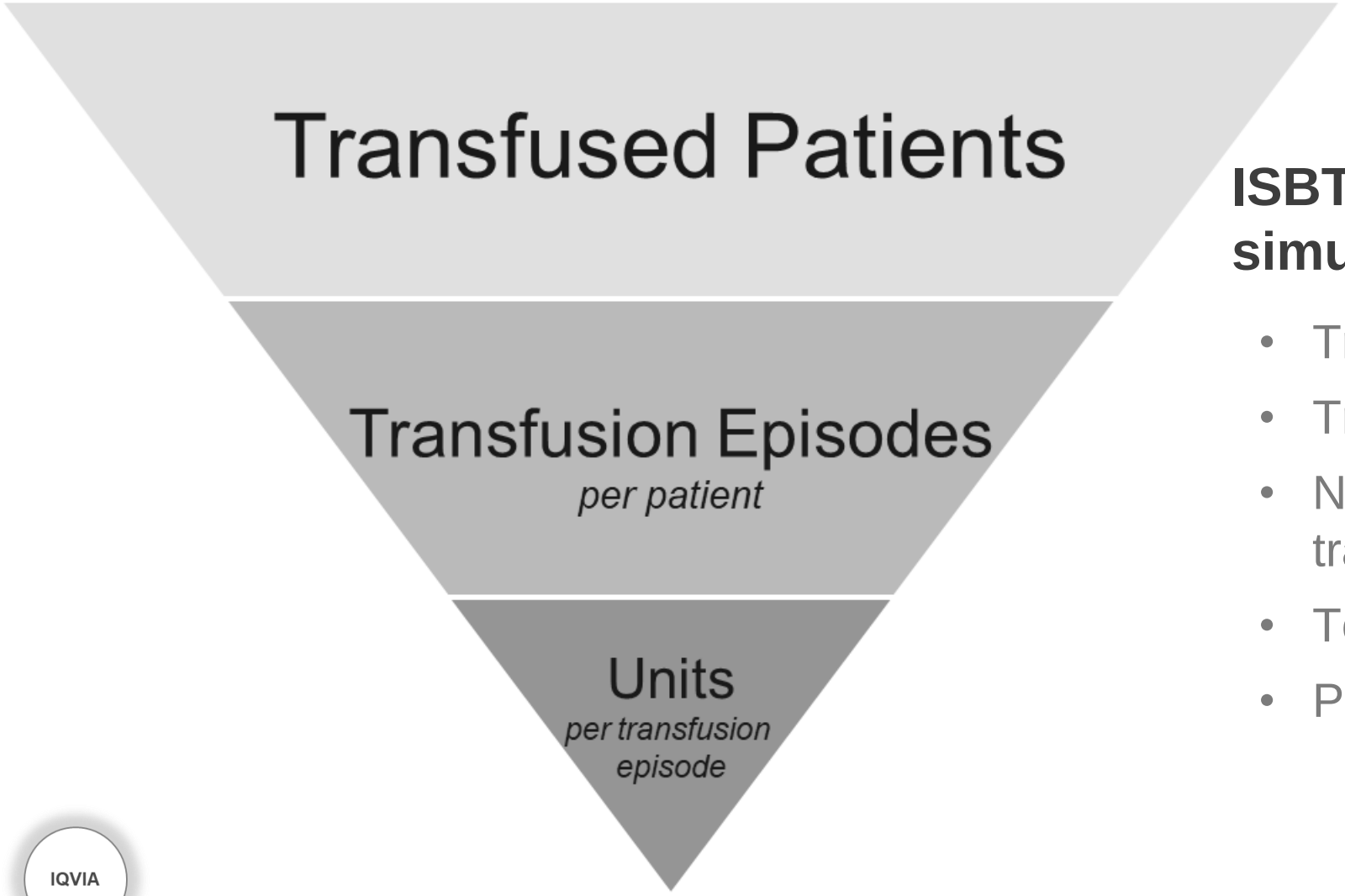
Patterns of Blood Component Utilization

Results Presented Last Year



ISBT 128 codes within EHR data sources allow the capture of a greater proportion of transfusions and more granular information about blood collection and modification methods compared to the use of administrative or billing codes.[21]

Patterns of Blood Component Utilization



ISBT 128 codes allows for the simultaneous ascertainment of:

- Transfused Patients
- Transfusion Episodes
- Number of units transfused per transfusion episode
- Total number of units transfused
- Processing and collection method

Patterns of Blood Component Utilization

Study Aim: To identify and quantify transfused individuals, transfusion episodes, transfused units and processing methods on an annual basis.

Study Population: Any patient with at least one health encounter

Time Period: January 1, 2012 – December 31, 2018

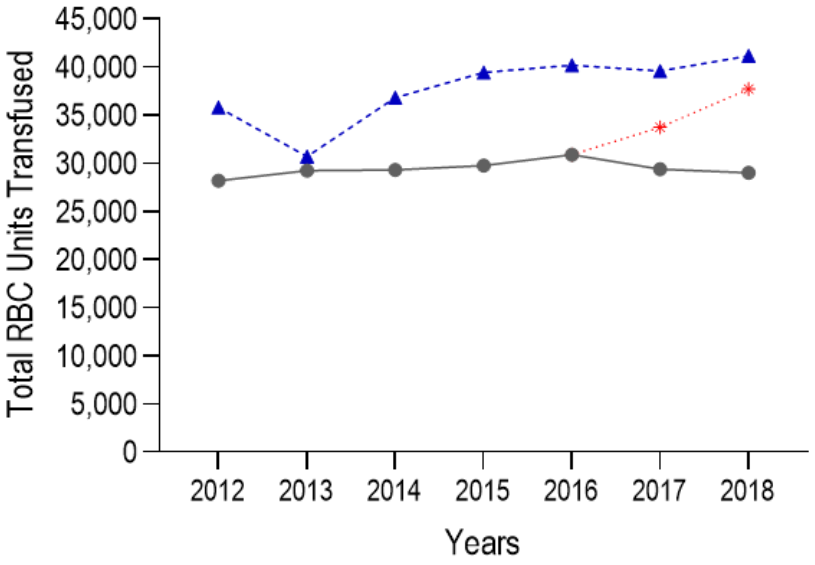
Data Sources: EHRs linked to blood bank data from three hospital network systems

- Regenstrief Institute
- Columbia University
- University of Colorado

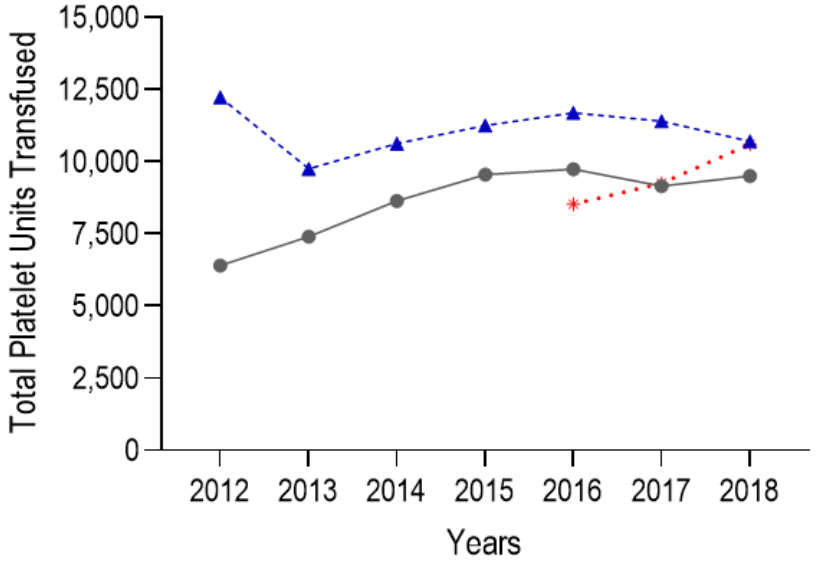
Patterns of Blood Component Utilization

Units of Red Blood Cells, Platelets, and Plasma from 2012-2018

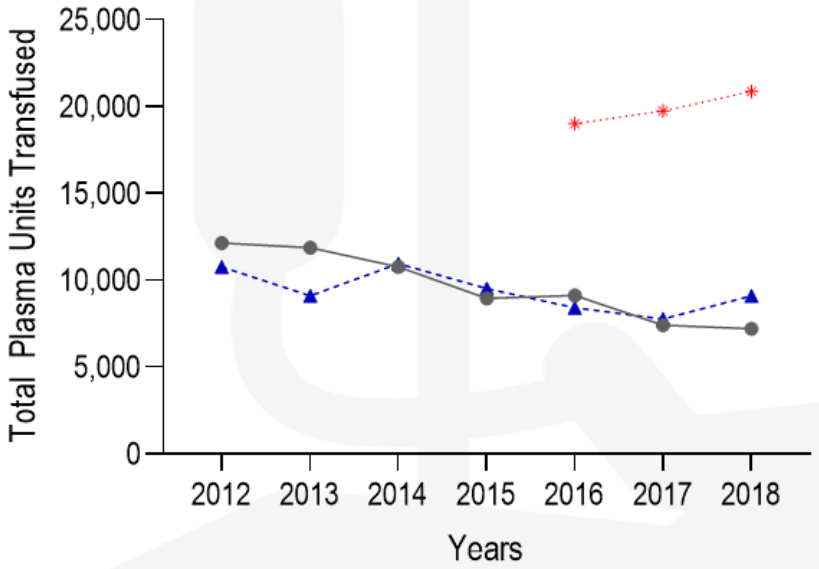
Red Blood Cells



Platelets



Plasma



Data Source 1 Data Source 2 Data Source 3

IQVIA

2019-2020 Updates and Accomplishments

- BEST Initiative Expansion
- Algorithm Development and Validation Studies
- Blood Component Utilization Studies
- **Blood Derived Products**

Immunoglobulin Utilization

Study Aim: To describe trends in utilization of intravenous and subcutaneous immunoglobulin

Study Population: Patients with at least one administration or dispensing of immunoglobulin

Unit of Analyses: Administrations, treatment episodes, patients, dosage administered

- Stratification by product brand

Time Period: January 2009 – December 2009

Data Sources: MarketScan and Medicare

IBM Acumen

For more detail on the studies presented here, please visit our website.

www.bestinitiative.org

Acknowledgment

CBER Surveillance Program Team

- Azadeh Shoaibi, PhD, MHS
- Tainya Clarke, PhD
- Judith U. Cope, MD, MPH
- Joyce Obidi, PhD
- Kristin A. Sepúlveda, BS
- Hui-Lee Wong, PhD
- Cindy Zhou, PhD

Office of Biostatistics and Epidemiology

CBER product offices: OVRR, OBRR, OTAT

Acumen

IBM

IQVIA

OHDSI Collaborators

- Columbia University
- Regenstrief Institute
- University of Colorado

THANK YOU

Richard Forshee

U.S. Food and Drug Administration

12th Sentinel Initiative Public Workshop:

CBER Surveillance Program

CMS and BEST Innovative Methods

Presented by:

Dr. Richard Forshee

Acting Deputy Office Director

Office of Biostatistics and Epidemiology

Center for Biologics Evaluation and Research

U.S. Food and Drug Administration

The views expressed in this presentation are those of the presenter and do not necessarily reflect those of the FDA

Outline

- **Centers for Medicare and Medicaid Services Data**
- **Biologic Effectiveness and Safety (BEST) Innovative Methods**

CMS Addresses Regulatory Questions

- **Near-Real Time Monitoring**
- Ongoing Monitoring for COVID-19 Pandemic

Near-Real Time Monitoring

- Rapidly updating database allows capture of events within a few days
  - Over 40% of all hospitalizations identified within 10 days of admission, and ~80% identified within 25 days.
  - Daily updates of data support near-real time tracking of cases
- Robust infrastructure for rapid processing and analysis
  - Data are processed and synthesized in less than 24 hours
  - Events stratified by types of services (e.g., ventilator use), demographic groups, and patient health circumstances
  - Events summarized at different levels, including individual hospital/provider, or geographical aggregations (e.g., county, metropolitan area, state)
- Dynamic graphical tools to easily identify temporal and spatial trends

Outline

- Near-Real Time Monitoring
- **Ongoing Monitoring for COVID-19 Pandemic**

Ongoing Real-Time Monitoring: COVID-19

- FDA's ongoing surveillance with Acumen and CMS includes the tracking of COVID-19 related outcomes and tests:
  - Provides counts and trends as of the prior day (i.e., June 6th includes data up to June 5th, 2020)
  - Counts provided at the county, state and national level; with planned expansion to individual hospital level counts
  - Events stratified by population, care setting, and evaluated using different metrics (e.g., cumulative since January 2020, new events in recent week)
  - Processed counts are adjusted to account for historical claims-delay patterns to estimate the actual count of events on a given day
  - Counts are benchmarked against counts of the same event (or similar events) in the past to provide context
  - Currently updated weekly; daily updates are available if needed

Ongoing Real-Time Monitoring: COVID-19

- These data provide:
  - Information on current temporal and geographic trends in COVID-19
  - Data about local COVID-19 risks to use in vaccine effectiveness studies

- Developing these tools built valuable data infrastructure for all future COVID-19 projects

Ongoing Real-Time Monitoring: Interactive Tool

- The COVID-19 Explorer tool contains maps, charts, and accompanying data tables that are dynamically adjusted based on the user's selection criteria of outcome, population, care setting, and metric:
  - Interactive maps can be used to identify counties and states that have relatively high outcome counts or are over their health system capacity
  - Charts display progression of selected measure criteria over time
  - Tables provide underlying data for the charts and maps
  - All figures and tables can be downloaded in easily usable formats

FDA U.S. FOOD & DRUG ADMINISTRATION

BEST Innovative Methods

Overview

Aim:
To leverage innovative methods for automated reporting of biologic-product adverse events (AE)

FY2020 Accomplishment:
Built an operational prototype enabling the semi-automated delivery of AE case reports from EHRs to FDA FAERS/VAERS

Demonstrations

Data

- Connected to live EHR data systems with a 12.5M patients
- Data are ingested in interoperable format (FHIR and OMOP) with automated data quality checks

ENCNTR_ID

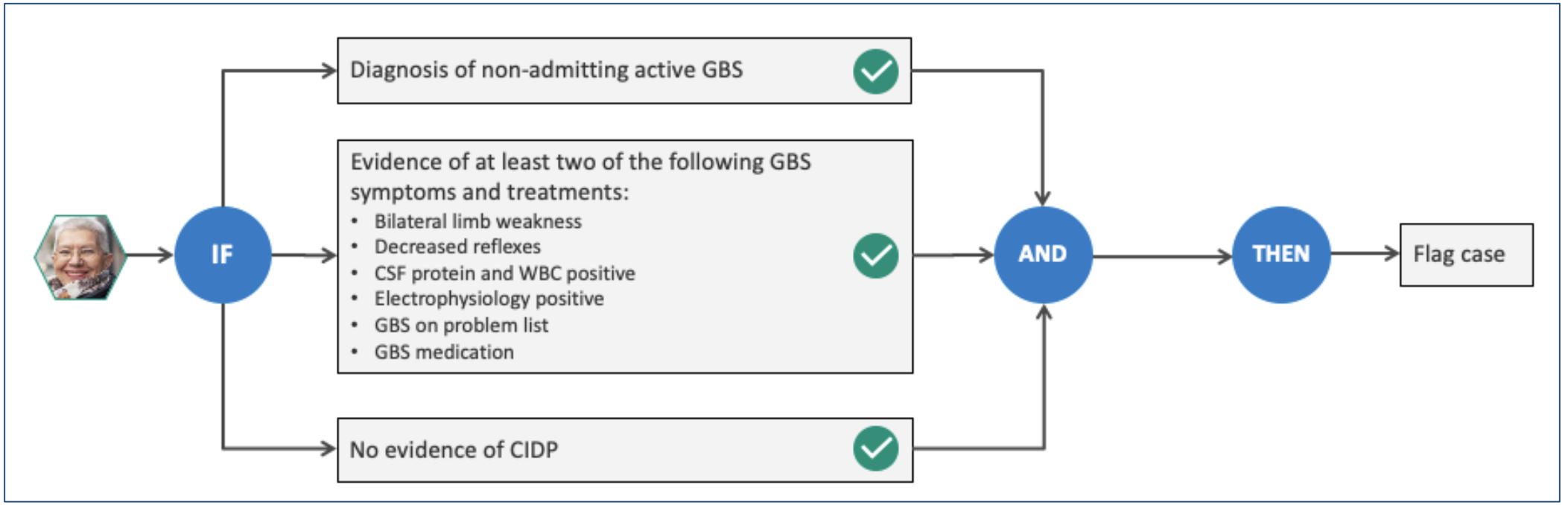
Status	Expectation	Observed Value
✓	is a required field.	--
✓	values must never be null.	100% not null
✓	values must match this regular expression: `^[0-9]*$`.	0% unexpected
✗	values must belong to this set: `$PARAMETER`.	≈1.862% unexpected

Example of data quality check

Demonstrations

Detect

- Automated detection using algorithms for 6 vaccine and blood AEs
- Algorithms are portable and utilize clinical notes (NLP)



Visual of GBS phenotype algorithm logic

Demonstrations

Validate

- Semi-automated tool for efficient chart review
- Algorithms validations resulted in PPVs ranging from 92% to 100%

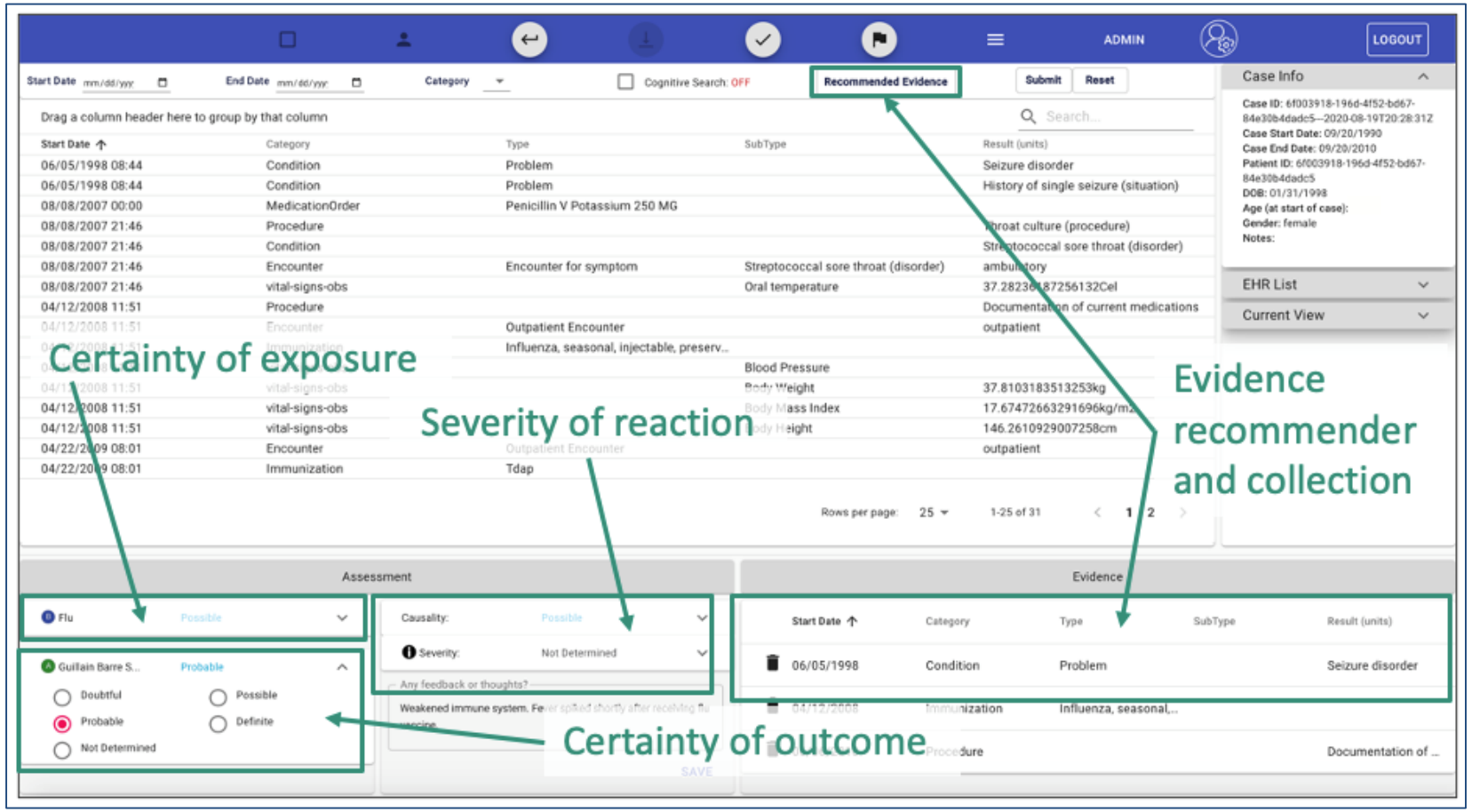


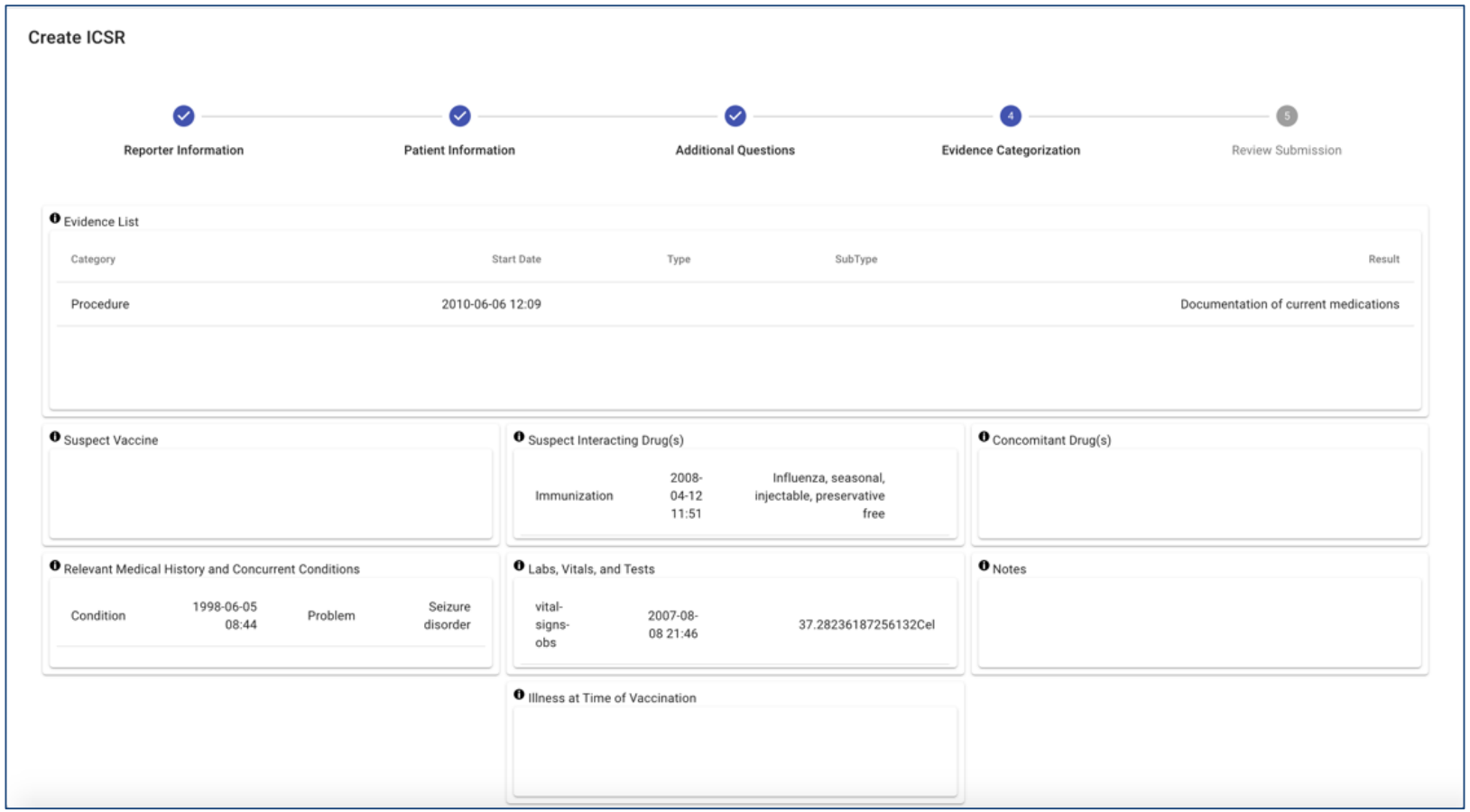
Chart review tool user interface features

**Simulated data*

Demonstrations

Report

- Semi-automated population of conformant ICSRs
- Submitted 50 case reports to FAERS and VAERS



Case report generation

**Simulated data*

Acknowledgements

FDA CBER Office of Biostatistics and Epidemiology

- Led by Steven Anderson and Hussein Ezzeldin
- Supported by Alan Williams, Artur Belov, Barbee Whitaker, Jane Mutanga, Judy Richardson, Manette Niu, Martin Ho, and Telba Irony

IBM Delivery Team

- Partnerships with MedStar Health Research Institute, OneFlorida Consortium, Georgia Tech Research Institute
- Subject matter expertise from Baystate Health, Vanderbilt, and 1upHealth

FDA/CMS/Acumen Team

- FDA/CBER/OBE: Rich Forshee, Yun Lu, Mikhail Menis
- FDA/CBER/OVRR: Hector S. Izurieta, Douglas Pratt
- FDA/CDER: David J. Graham
- CMS: Jeffrey Kelman
- Acumen: Yixin Jiao, Mao Hu, Yue Wu, Yoganand Chillarige, Michael Wernecke

Session II — Audience Q&A

Building the BEST Network and Establishing New Capabilities for the Surveillance of Biologics

BREAK

2:20 pm – 2:30 pm

Session III: Leveraging the Sentinel Initiative for COVID-19

2:30 pm – 3:30 pm

Gerald Dal Pan

U.S. Food and Drug Administration

Jeffrey Brown

Harvard Pilgrim Health Care Institute

Leveraging the Sentinel System for COVID-19

Jeffrey Brown, PhD
Sentinel Operations Center

Twelfth Annual Sentinel Initiative Public Workshop

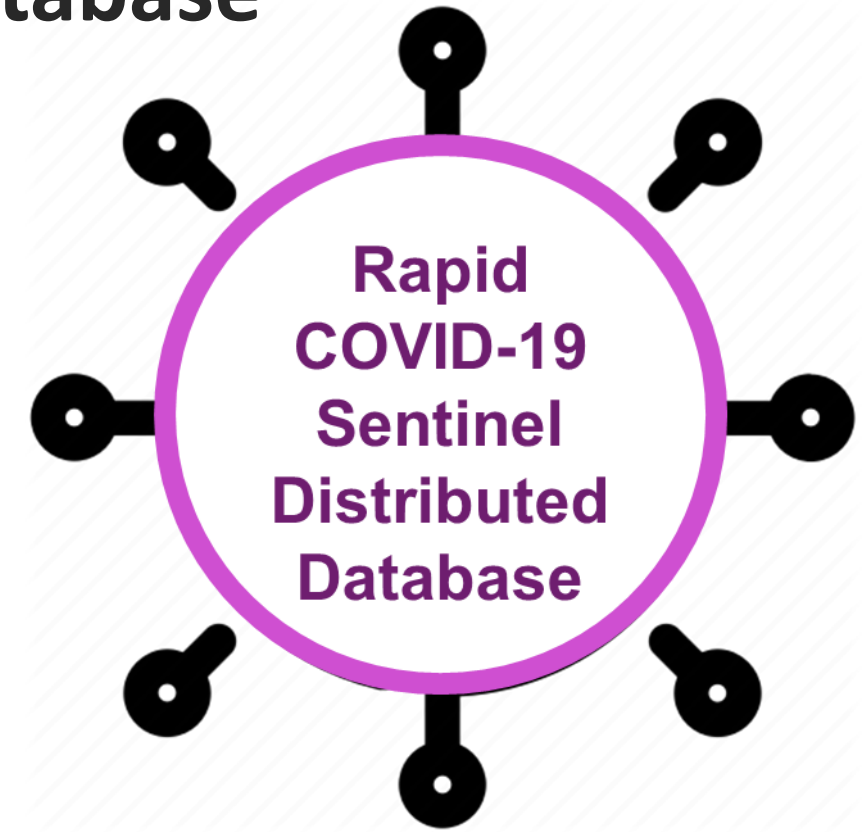
October 14, 2020

Infrastructure and Data Considerations

- Information urgency: need for near real-time data
- Identification of infection status and COVID-19 cohort definitions
  - Capture of lab results, type of lab, shifting coding practices across time and location
- Identification of exposure details
  - Registries, claims, pharmacies, inpatient, medical records, other
- Competing demands on data and scientific partners
  - Multiple organizations making demands on a small group of critical partners
- Coordination and collaboration across organizations will be critical

Rapid COVID-19 Sentinel Distributed Database

- Uses Sentinel Common Data Model Core tables + COVID-19 Lab Results
- Freshest feasible data
  - Data from 1/1/2018 – present
- Data curation: Model compliance data quality assurance
- Allows use of standard querying tools for rapid querying and response



Near-Real Time Data with Current Partners: Complexity and Experience

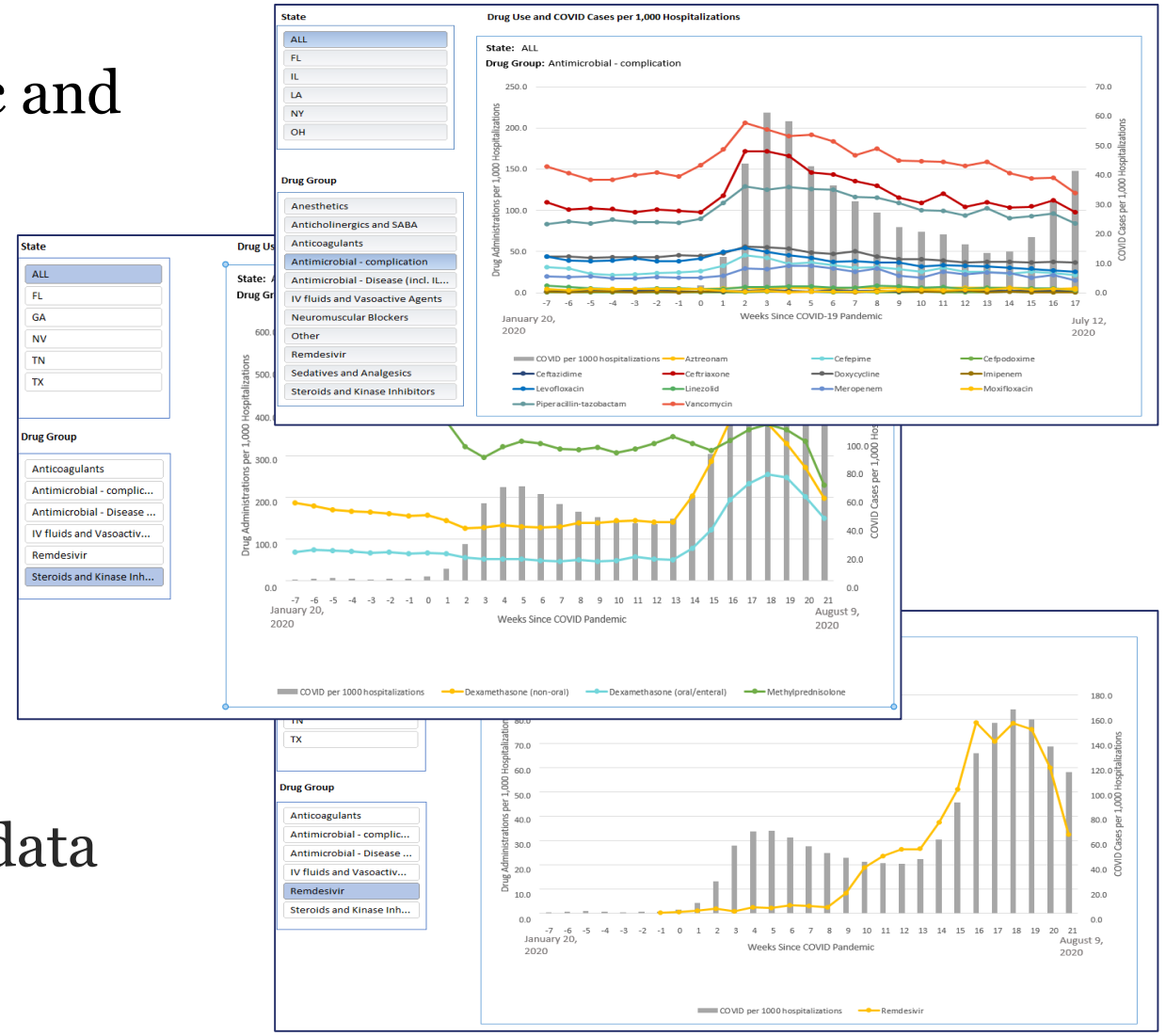
- At any point in time the data are "incomplete"
  - Claims data typically arrives in multiple streams with different data lags
  - Unadjudicated claims or open claims are subject to revision
  - EHR data is not immune: Post-discharge updates v. within-hospitalization updates
  - "Daily" feeds can capture differential diagnoses or other data subject to change

- At any point in time exposures will be more completely captured than outcomes
  - Bias depends on study design and whether data delays are non-differential
  - Analytic solutions exist but they do not apply to all designs

- Sentinel has substantial experience with existing data partners in addressing data lag and uncertainty issues and with the methodologic approaches for addressing them

New Partnerships Enable Rapid Querying of Near Real-Time EHR Data

- Interactive dashboards show geographic and temporal patterns in inpatient drug use
  - Up to 120 critical drugs including:
    - Antimicrobials
    - Dexamethasone
    - Remdesivir
- COVID-19 hospitalization rates
- COVID-19 patient characteristics
- Co-morbidities and complications
- Rapid and interactive querying of EHR data



Validation of Hospitalized COVID-19 Detected from Claims-Based Algorithms

- Validation of hospitalized COVID via positive laboratory diagnostic tests to assess the performance of ICD-10 diagnosis code-based algorithms for COVID-19 patient identification
- Algorithms that perform well may be used by Sentinel and others to identify hospitalized cases when lab data are unavailable or incomplete
- Study included 5 data partners, 5 different algorithms, and 3 assessment periods
- Positive predictive value (PPV) and sensitivity similar across algorithms
  - Simplest algorithm, ICD-10 code U07.1 alone, performed similarly to broadest algorithm (5 coronavirus codes including U07.1).
  - Across all periods, PPV was ~86% for all algorithms

Leveraging the Sentinel Initiative for COVID-19

Thank You

Jeffrey Brown, PhD
Sentinel Operations Center

Twelfth Annual Sentinel Initiative Public Workshop

October 14, 2020

Vincent Lo Re

University of Pennsylvania

Sentinel

Studying the Natural History of COVID-19: Risk of Arterial and Venous Thrombotic Events in the Sentinel System

12th Annual Sentinel Initiative Public Workshop

October 14, 2020

Vincent Lo Re, MD, MSCE, FISPE

Division of Infectious Diseases

Center for Clinical Epidemiology and Biostatistics

Perelman School of Medicine, University of Pennsylvania

Need for Real-World Evidence on COVID-19

- **Numerous limitations of existing data:**
  - Bulk of evidence from case reports, series
  - Limited sample sizes from single centers
  - Inherent biases (selection, misclassification), lack of control of confounders
- **Sentinel offers unique opportunity for real-world evidence on COVID-19**
  - Epidemiology, natural history of COVID-19
  - Effects of chronic medications taken in ambulatory setting on course of COVID-19
  - Safety, effectiveness of COVID-19 therapies

Sentinel COVID-19 Natural History Master Protocol

- **Provides approaches to identify COVID-19 patients in the Sentinel System**
- **Delineates variables relevant to such analyses**
  - Feasibility of collection of these variables within Sentinel's Data Partners
  - Proposed code lists for variables
- **Considers potential limitations of methods, approaches to address**
  - Biases (selection, misclassification, protopathic)
  - Unmeasured confounding variables
  - Generalizability

Reports of Abnormalities in Blood Coagulation

- **Arterial, venous thrombotic events**
  - Arterial occlusion (acute MI, ischemic stroke), even at younger ages
  - Venous thromboembolism (DVT/PE, microthrombi on autopsy)
- **Coagulopathy**
  - ↑ D-dimer, fibrinogen levels
  - Disseminated intravascular coagulation

Assembled team, formulated Aims, applied methods from Master Protocol

Thachil J. *J Thromb Haemost* 2020:18:1023-6.

Sentinel Coagulopathy Workgroup: Specific Aims

- **Aim 1**: Determine 90-day incidence of arterial and venous thrombotic events (evaluated separately) with COVID-19 and risk of death within 90 days of an event.
  - Hypothesis: Events will occur within 90 days of COVID-19 diagnosis and may result in death.

- **Aim 2**: Evaluate patient characteristics present prior to COVID-19 diagnosis as risk factors for arterial and venous thrombotic events (evaluated separately).
  - Hypothesis: Characteristics that promote endothelial injury, stasis of circulation, and hypercoagulability will be risk factors for thrombosis.

- **Aim 3**: Compare 90-day risk of arterial and venous thrombotic events (evaluated separately) between health plan members with COVID-19 and those with influenza.
  - Hypothesis: Risk of thrombotic events will be higher with COVID-19 than influenza.

Significance of Study Aims

Biological

- Gain insights into risk factors for thrombotic events with COVID-19
- Determine if risk of events is higher for COVID-19 vs. influenza

Clinical

- Identify interventions to ↓ risk of thrombotic events with COVID-19
- Identify high-risk subgroups to inform decisions, enroll in future trials

Public Health

- Modifying risk factors for thrombotic events could prevent their development and prolong survival

Sentinel Coagulopathy Workgroup Activities to Date

- **Developed study protocol**
- **Establishing collaborations with multiple Sentinel Data Partners**
  - Integrated delivery system, claims partners
  - Increase sample size, enhance generalizability, permits evaluation of lab data
  - Allows for limited chart review to confirm PPVs of ICD-10-based outcomes
- **Working with Reagan-Udall Foundation**
  - Promote parallel analyses, enhance scientific validity

Acknowledgements:
Sentinel COVID-19 Coagulopathy Working Group

- **University of Pennsylvania**:
  - Dena M. Carbonari, MS
  - Sean Hennessy, PharmD, PhD
  - Rebecca Hubbard, PhD
  - Allyson M. Pishko, MD, MSCE
- **Sentinel Operations Center**:
  - Jeffrey Brown, PhD
  - Noelle Cocoros, DSc
  - Meighan Rogers Driscoll, MPH
  - Maria E. Kempner, BA
  - Jenice Ko, BS
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  - Silvia Perez-Vilar, PharmD, PhD
  - Brian Kit, MD
- **Funding source**:
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    - Task order 75F40119F19001

Steven Anderson

U.S. Food and Drug Administration

U.S. FOOD & DRUG ADMINISTRATION

COVID-19 Vaccine: Active Safety and Effectiveness Monitoring

Steve Anderson, PhD, MPP
Director, Office of Biostatistics & Epidemiology, CBER

12th Annual Sentinel Public Workshop
October 14, 2020

FDA COVID-19 Vaccine Monitoring

- Several COVID-19 Vaccine Phase 3 studies are currently underway in the United States
- Potentially, vaccine may be available following FDA approval or Emergency Use Authorization (EUA) in weeks or months
- Some COVID-19 vaccines may use new platform technologies (e.g., RNA)

- COVID-19 vaccine safety will be continuously monitored in postmarket setting by FDA – planning is underway for using:
  - Passive surveillance (VAERS – Vaccine Adverse Event Reporting System)
  - Active surveillance approaches – BEST, FDA-CMS systems, others

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COVID-19 Vaccine Monitoring Considerations

- Vaccine benefit-risk considerations are different from therapeutics used for life-saving purposes
- Vaccines are given to healthy people
- Tolerance for vaccine risks may be lower

- Accordingly, high quality data and information needed to assess and confirm potential adverse events or safety concerns for COVID-19 vaccines

COVID-19 Vaccine Monitoring Data Considerations

- Rapid data access for near real time surveillance
- Large databases of tens of millions of patients for evaluating vaccine rare serious adverse events
- Data needed representing integrated care spectrum – outpatient, physician, inpatient, etc.
- Rapid confirmation of safety signals/concerns: Significant clinical detail or use of medical chart

COVID-19 Vaccine Monitoring Infrastructure Considerations

- Case definitions for AEs of interest
- Algorithm, phenotype development and validation
- Rapid on-demand analytics and tools
- Master Protocols for Safety and Effectiveness outcomes
- Subject Matter Experts to support monitoring efforts

CBER Active Monitoring Program for Vaccine Safety and Effectiveness

1. Biologics Effectiveness and Safety (BEST) System

- Several partners – IBM Watson, IQVIA, Acumen, HealthCore, Humana, Optum, Healthagen, Academic organizations
- Represents variety of healthcare settings – inpatient, outpatient, etc.
- >100 million persons - using Claims (billing) data
- >20 million persons - using Electronic Health Records (EHR)
- >5 million persons - using Claims-EHR linked data

2. CMS (Center for Medicare & Medicaid Services)

- **Federal Partners**
  - Ongoing FDA-CMS partnership on vaccine safety since 2002
  - Data cover very large population of approximately 55 million elderly US beneficiaries ≥65yrs of age
  - >92% of US elderly use Medicare so database represents the elderly population and not a sample
  - Represents variety of healthcare settings – inpatient, outpatient, etc.
  - Consists of claims data with access to medical charts

FDA Safety Surveillance of COVID-19 Vaccines : DRAFT Working list of possible adverse event outcomes ***Subject to change***

- Guillain-Barré syndrome
- Acute disseminated encephalomyelitis
- Transverse myelitis
- Encephalitis/myelitis/encephalomyelitis/ meningoencephalitis/meningitis/ encepholapathy
- Convulsions/seizures
- Stroke
- Narcolepsy and cataplexy
- Anaphylaxis
- Acute myocardial infarction
- Myocarditis/pericarditis
- Autoimmune disease
- Deaths
- Pregnancy and birth outcomes
- Other acute demyelinating diseases
- Non-anaphylactic allergic reactions
- Thrombocytopenia
- Disseminated intravascular coagulation
- Venous thromboembolism
- Arthritis and arthralgia/joint pain
- Kawasaki disease
- Multisystem Inflammatory Syndrome in Children
- Vaccine enhanced disease

FDA COVID-19 vaccine safety surveillance planning

"Near real-time surveillance" or rapid-cycle analyses (RCA)

- Plan to monitor 10 -20 safety outcomes of interest to be determined based on:
  - Pre-market review of sponsor safety data submitted to FDA
  - In coordination with federal partners, international regulatory partners and organizations, academic experts, others
  - Literature and regulatory experience with similar vaccines, novel vaccine platforms, and using other relevant data

FDA Near Real Time Surveillance / RCA Experience

FDA and CMS - RCA

- Conduct “near real-time” surveillance for annual influenza vaccine and Guillain-Barre Syndrome(GBS) since 2007
- Support confirmation of CDC rapid-cycle analyses of safety for seasonal influenza vaccine, Shingrix, and others
- FDA plans on using CMS data for COVID-19 vaccine RCA – near real time

FDA Sentinel – Rapid Surveillance

- Near real-time, rapid surveillance in 2017-2018 seasonal influenza vaccine – evaluation of 6 health outcomes of interest

Planned FDA COVID-19 vaccine safety surveillance

- **Epidemiological analyses**
  - Need capability to resolve potential safety signals identified from ‘near real-time’ surveillance, TreeScan and other sources
  - Rapid queries and small epidemiological studies
  - Larger self-controlled, case control, comprehensive protocol-based studies

Current COVID-19 Vaccine Effectiveness Surveillance

- COVID-19 vaccine(s) – there may be limited information available at licensure on level and duration of effectiveness
- Manufacturers may conduct certain COVID-19 vaccine effectiveness post-licensure studies
- FDA may conduct COVID-19 vaccine effectiveness studies
  - General effectiveness studies – including subpopulations of interest
  - Duration of protection studies
  - Others

US Government-wide Efforts COVID-19 Vaccine Monitoring

Large US Government Effort

FDA Coordinating its COVID-19 vaccine safety and effectiveness monitoring efforts with other government agencies:

- Centers for Disease Control (CDC)
- Centers for Medicare& Medicaid Services (CMS)
- Veterans Administration (VA)
- National Institutes of Health
- Department of Defense
- Indian Health Services

- Weekly meetings between FDA and CDC, regular meetings with VA and CMS
- Planned sharing of protocols, discussion safety and effectiveness outcomes of interest

Plans in development for FDA (CMS), CDC, VA to conduct RCA for several potential AEs in each of their data systems:

CMS, BEST, Vaccine Safety Datalink, VA Health Data

Acknowledgments

- Richard Forshee
- Azadeh Shoaibi
- Hui-Lee Wong
- CBER Surveillance Team
- Manette Niu
- CBER OBE Colleagues
- CDC Colleagues
- CMS Colleagues
- VA Colleagues
- FDA Partners: Acumen, IBM Watson – and new partners in FY2021

Thank you!

Questions?

Hui-Lee Wong

U.S. Food and Drug Administration

FDA U.S. FOOD & DRUG ADMINISTRATION

12th Sentinel Initiative Public Workshop:

CBER Surveillance Program

Coronavirus (COVID)-19 Activities

Presented by:

Hui Lee Wong, PhD

Office of Biostatistics and Epidemiology
Center for Biologics Evaluation and Research
U.S. Food and Drug Administration

The views expressed in this presentation are those of the presenter and do not necessarily reflect those of the FDA

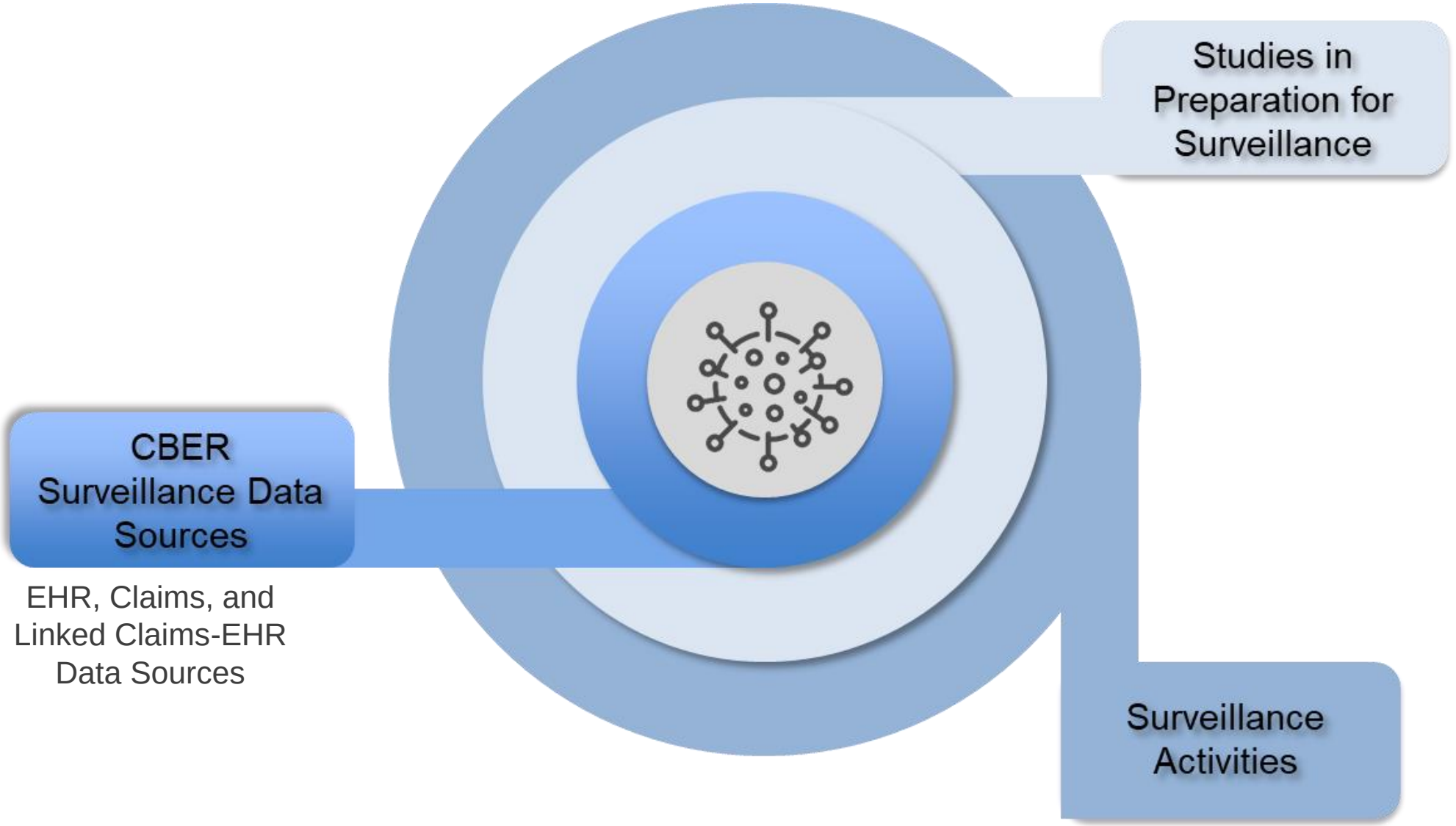
COVID-19 Activities

- Pandemic Preparedness
- Studies in Preparation for Surveillance
- COVID-19 Surveillance Activities

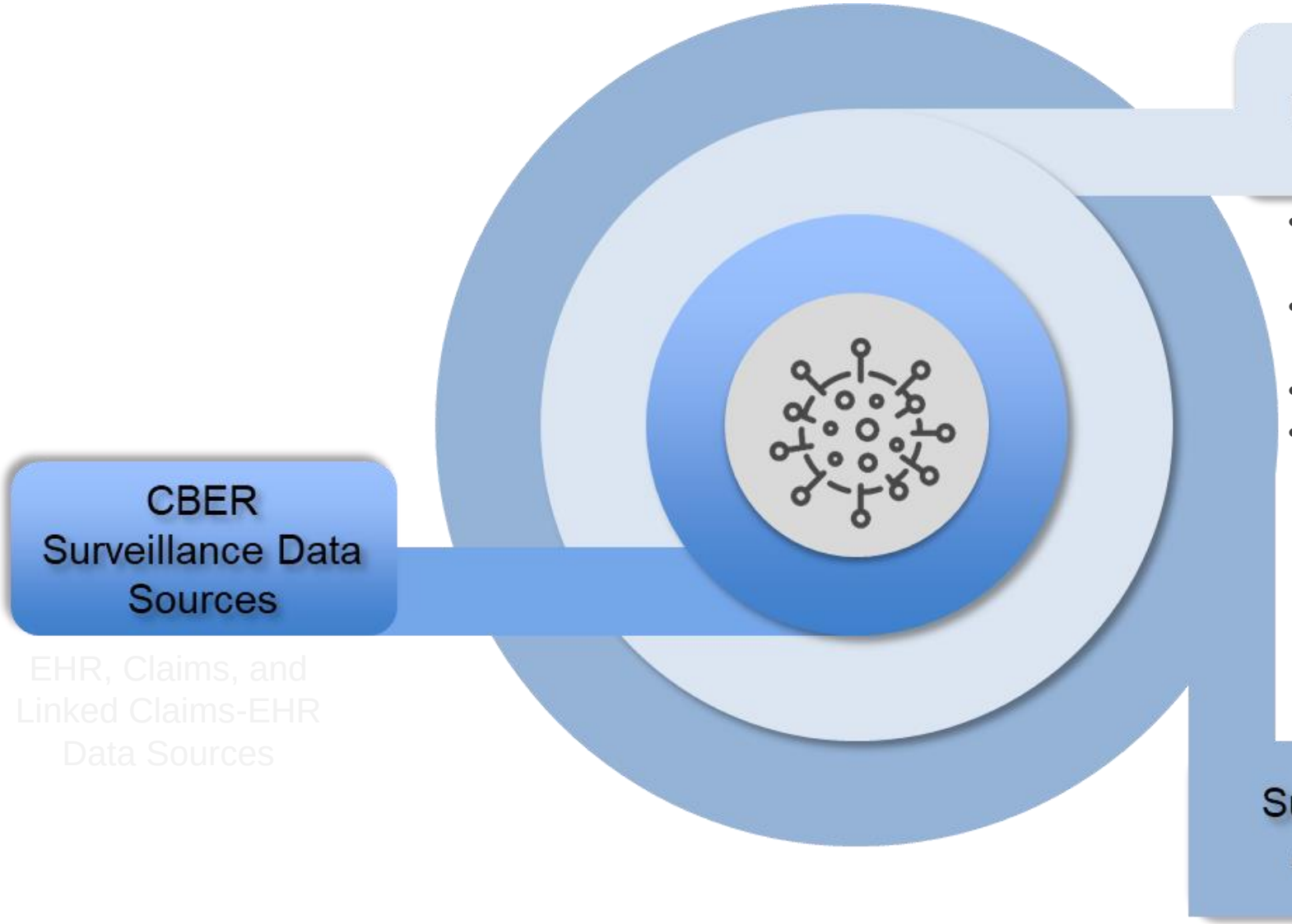
COVID-19 Activities

- **Pandemic Preparedness**
- **Studies in Preparation for Surveillance**
- **COVID-19 Surveillance Activities**

Pandemic Preparedness

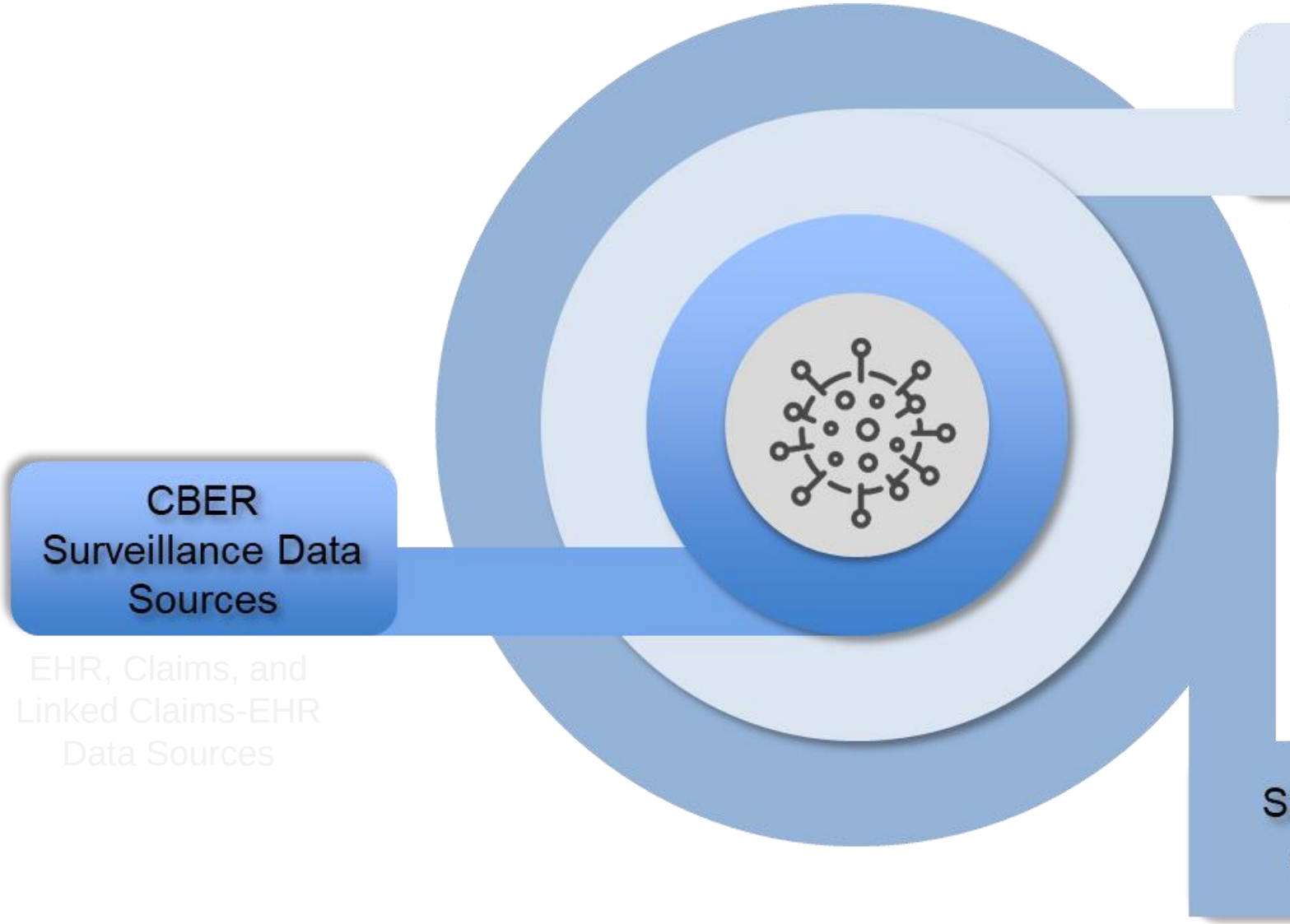


Pandemic Preparedness



- Characterization of COVID-19 patient cohorts in EHRs
- Validating claims-based COVID-19 ICD-10 diagnoses codes
- COVID-19 test-positivity trends
- Risk factors of COVID-19 mortality

Pandemic Preparedness



- Characterization of COVID-19 patient cohorts in EHRs
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- COVID-19 test-positivity trends
- Risk factors of COVID-19 mortality

- Convalescent Plasma
- COVID-19 Vaccine

COVID-19 Activities

- Pandemic Preparedness
- **Studies in Preparation for Surveillance**
- COVID-19 Surveillance Activities

Studies in Preparation for Surveillance

Characterization of COVID-19 Patients in EHRs

Study Aim: To characterize hospitalized patients with COVID-19

- COVID-19 symptoms and diagnoses
- Baseline comorbidities
- Intensive Care Unit status
- Oxygenation status
- Concomitant medications

Data Sources: Three EHR data sources

- IBM Explorys
- OneFlorida
- An academic health system

IBM

Studies in Preparation for Surveillance

Validating claims-based COVID-19 ICD-10 diagnosis code

Study Aim: Validation of ICD-10 code U07.1

Data Sources: Linked claims-EHRs and claims with lab results: *in progress*

- IBM Explorys
- OneFlorida-Medicaid
- MarketScan

IBM

Studies in Preparation for Surveillance

COVID-19 RT-PCR Test Positivity

Study Aim: To estimate positivity rates in patients tested with SARS-CoV-2 RT-PCR test

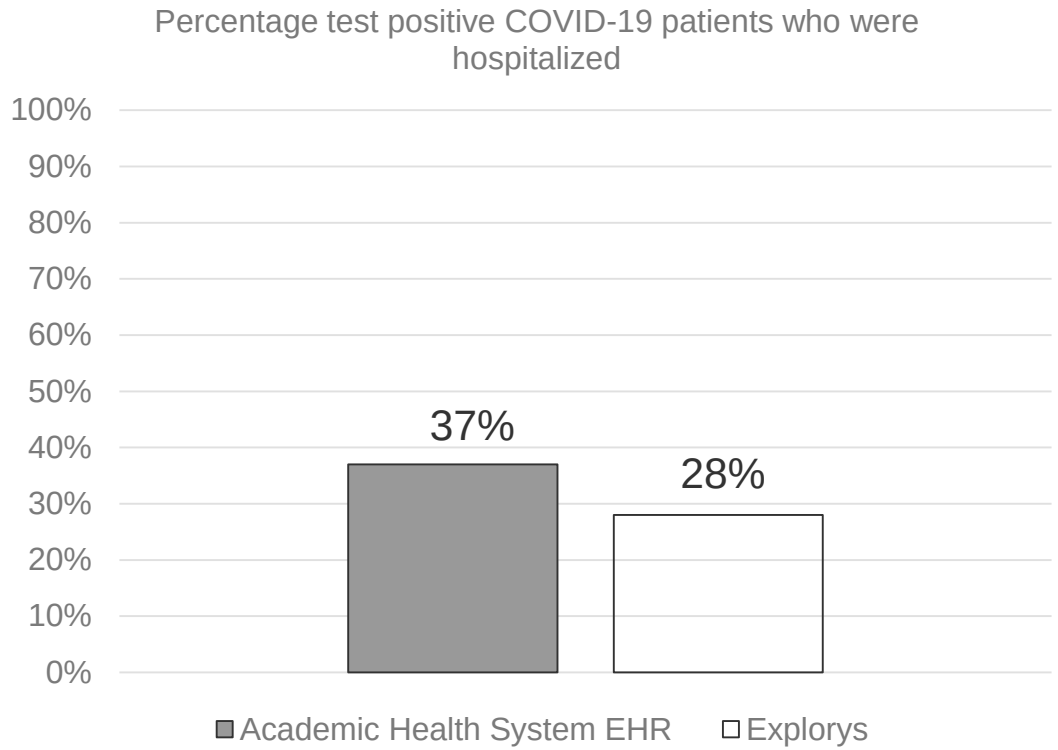
Data Sources: Three EHR data sources

- An academic health system
- IBM Explorys
- OneFlorida

IBM

Studies in Preparation for Surveillance

COVID-19 RT-PCR Test Positivity in EHRs



Study Population
N= ~250,000 patients with SARS-CoV-2 RT-PCR results

Proportion of hospitalization among those tested positive

~1/3 of those tested positive were hospitalized

IBM

Studies in Preparation for Surveillance

COVID-19 RT-PCR Test Positivity in EHRs

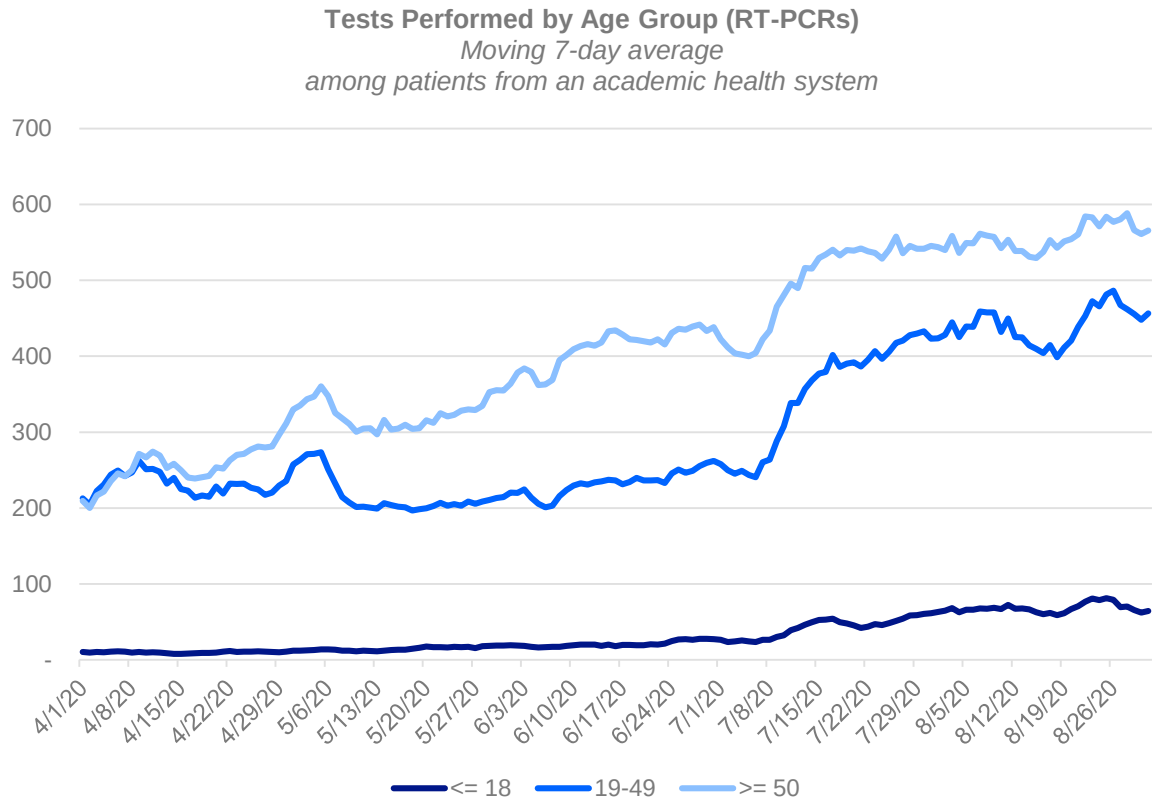
Time to receive test results after test orders:

	Academic Health Center EHRs	Explorys
> 75% of test results within	1 day	2 days
> 95% of test results within	5 days	9 days

IBM

Studies in Preparation for Surveillance

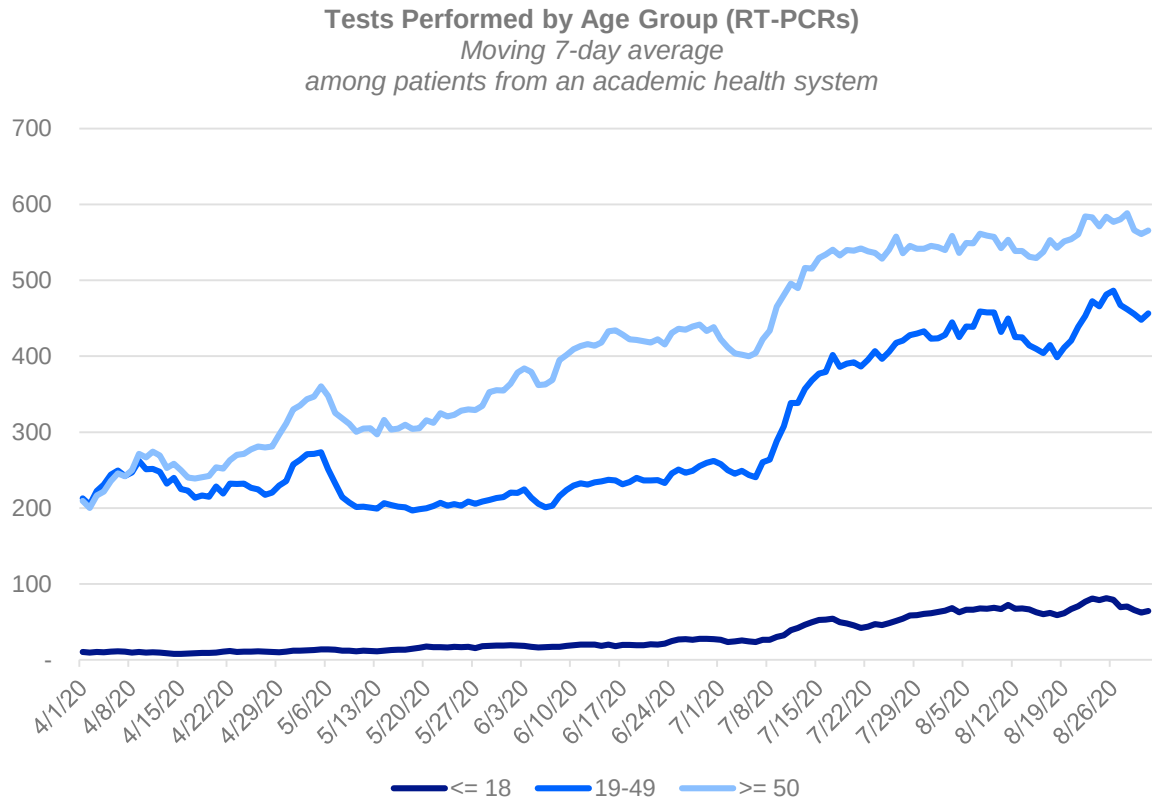
COVID-19 RT-PCR Test Positivity Trends by Age

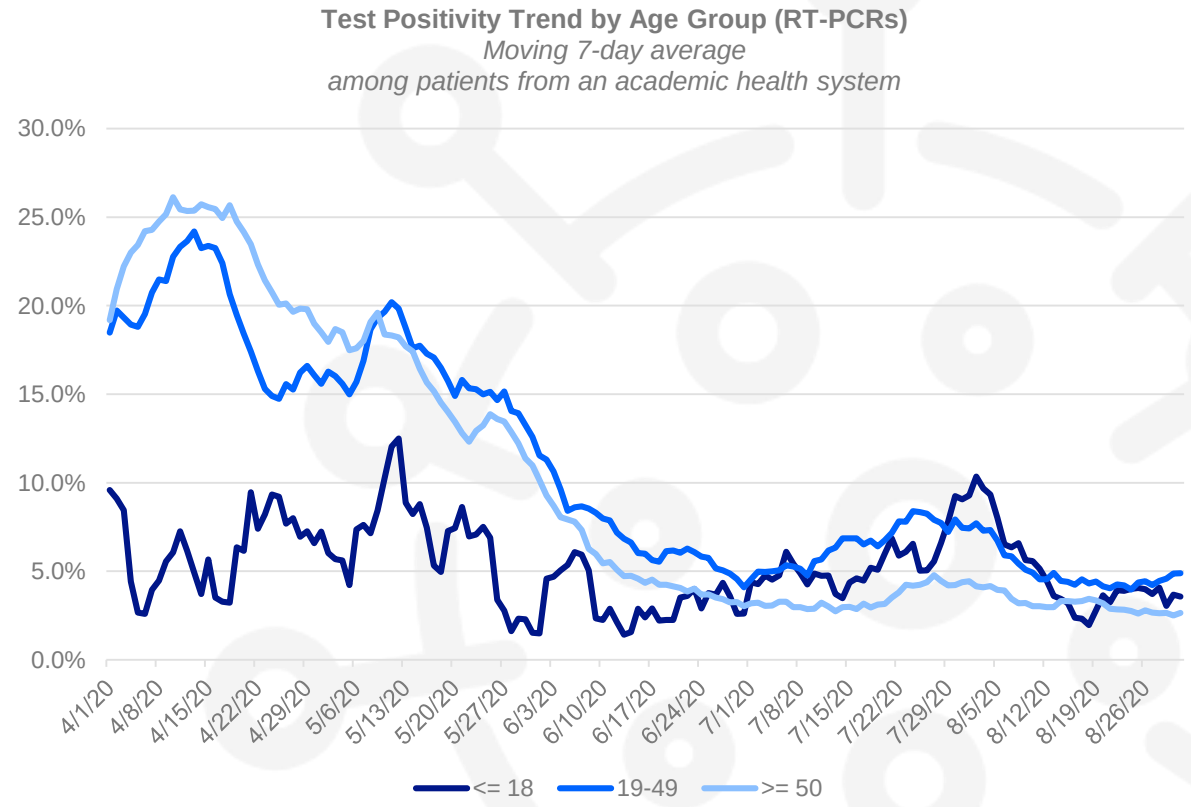


* Study period truncated at April 2020 to account for stable test volume

Studies in Preparation for Surveillance

COVID-19 RT-PCR Test Positivity Trends by Age





* Study period truncated at April 2020 to account for stable test volume

Studies in Preparation for Surveillance

Risk Factors of COVID-19 Hospitalization and Mortality in Medicare*

Study Aim: To evaluate risk factors for COVID-19 related hospitalizations and deaths for Medicare fee-for-service (FFS) beneficiaries

Study Population: Beneficiaries (n> 30M) enrolled in Medicare FFS for at least six months prior to April 1

Study Period: April 1- May 8, 2020

Outcomes:

Primary: Hospitalization, mortality

Secondary: Hospitalization-related outcomes

Acumen

*Source: Natural history of COVID-19: Risk factors for hospitalizations and deaths among >26 million U.S. Medicare FFS beneficiaries. Izurieta et al, 2020 submitted for publication

Studies in Preparation for Surveillance

Summary of COVID-19 Related Outcome Rates by Population

Summary	Elderly Medicare Parts A/B FFS Population not in NH, w/o ESRD	
	#	Rate*
All Beneficiaries	***25,348,184***	
COVID-Related Deaths	12,624	4.98
COVID-19 Hospitalizations	27,981	11.04
Hospitalization-Related Outcomes	**#**	**% of Hospitalized**
ICU/CCU Admission	6,132	21.9%
Ventilator Use/ECMO	4,646	16.6%
Inpatient Renal Replacement Therapy	985	3.5%
Inpatient Death	7,301	26.1%

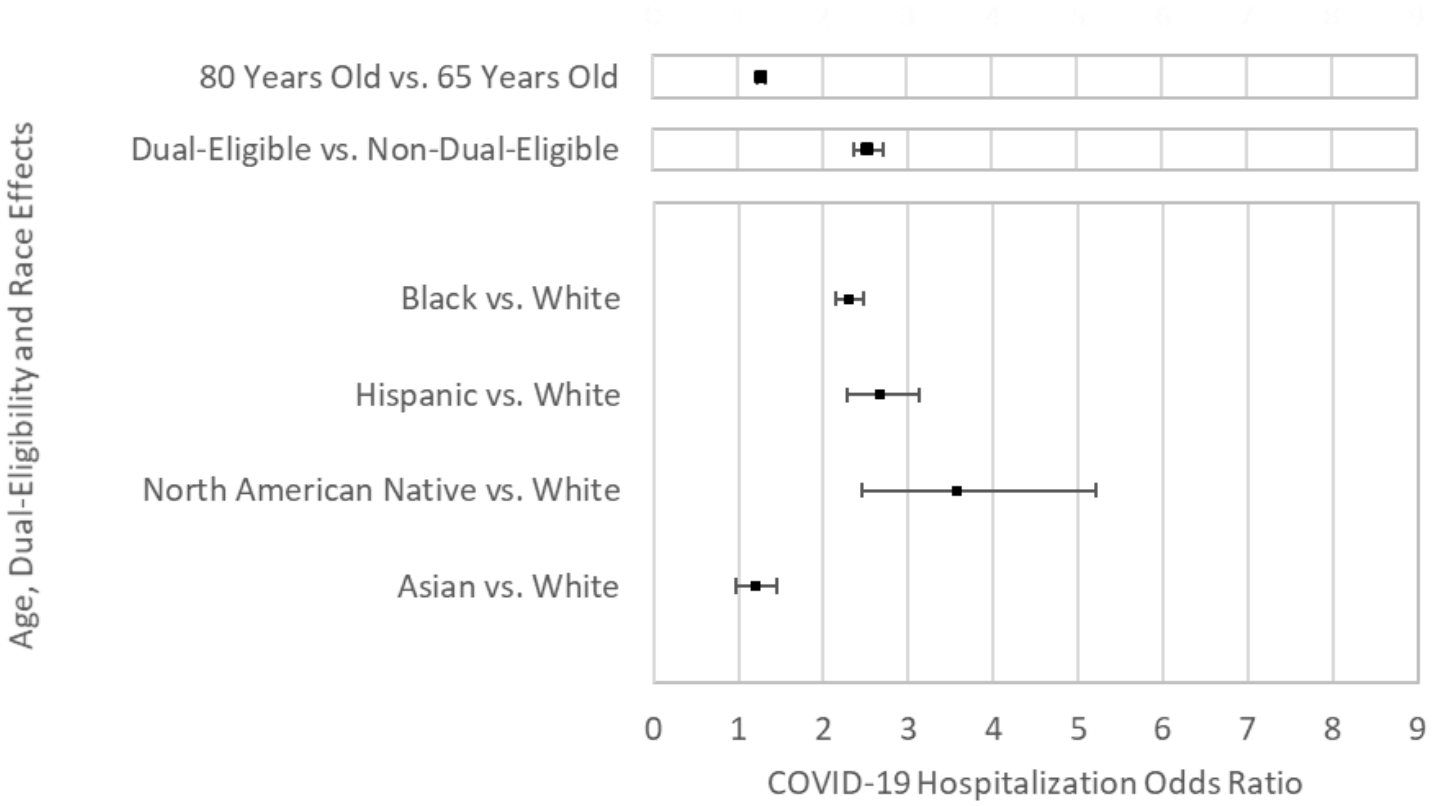
Note: ** Rate per 10,000*

Study population:

- Elderly (≥65 years) fee-for-service (FFS) beneficiaries not in nursing home (NH) without end-stage renal disease (ESRD)
  - n= 25, 348,184
- Elderly (≥65 years) FFS beneficiaries in NH
  - n=654,857
- FFS beneficiaries with ESRD
  - n= 293,659

Studies in Preparation for Surveillance

COVID-19 Hospitalization Risk by Demographics and Socioeconomic Status



COVID-19 hospitalization risk was higher among

- Older beneficiaries
- Dual-eligible versus non-dual-eligible beneficiaries
- Minorities compared to whites

Acumen

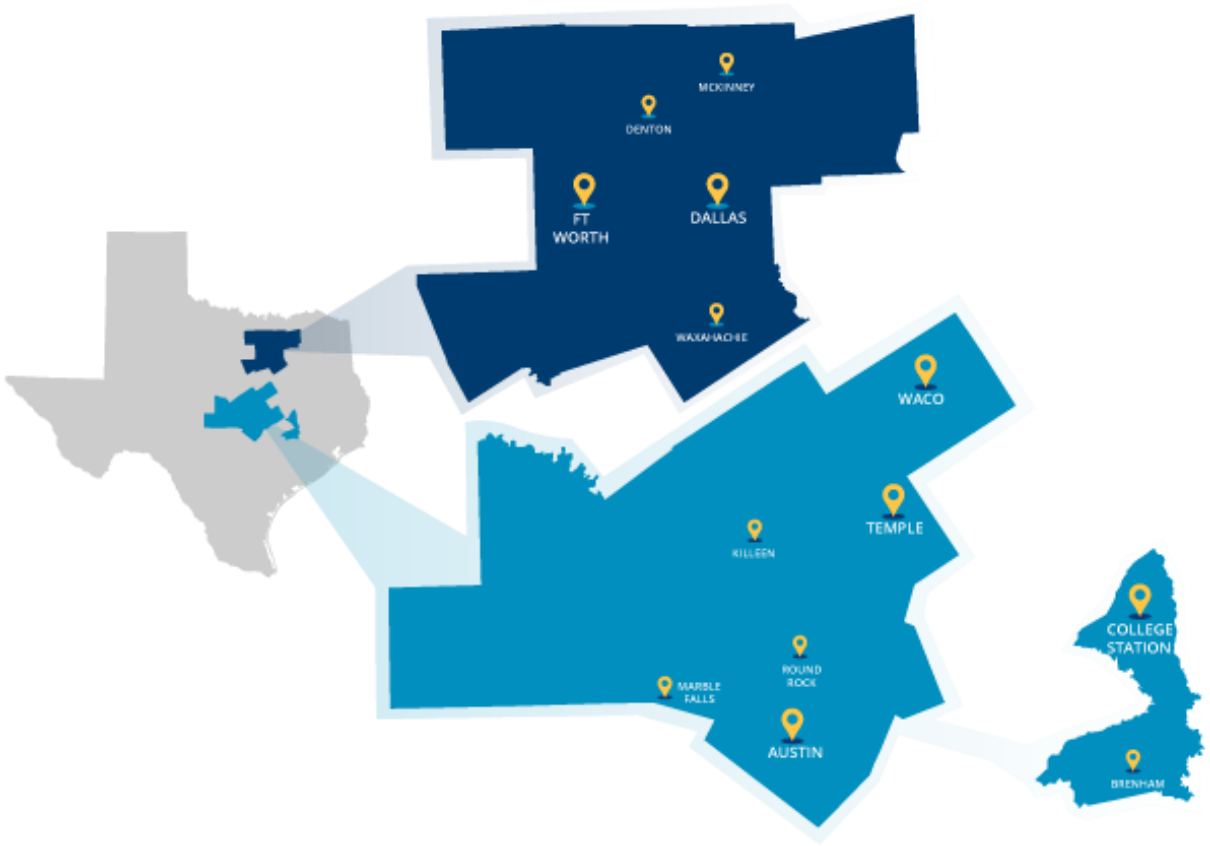
COVID-19 Activities

- Pandemic Preparedness
- Studies in Preparation for Surveillance
- **COVID-19 Surveillance Activities**

COVID-19 Surveillance Activities

Anti-SARS-CoV2 Convalescent Plasma (CP) in Patients with COVID-19

Baylor Scott White Health, Texas



Study Aim: To estimate the relative risk of outcomes between COVID-19 patients treated with CP and those not treated with CP

Data Sources: 27 hospital sites in Baylor Scott White Health Research Institute

COVID-19 Surveillance Activities

Anti-SARS-CoV2 Convalescent Plasma (CP) in Patients with COVID-19

Study Population: 700 CP treated patients and ~ 1400 non- CP treated patients

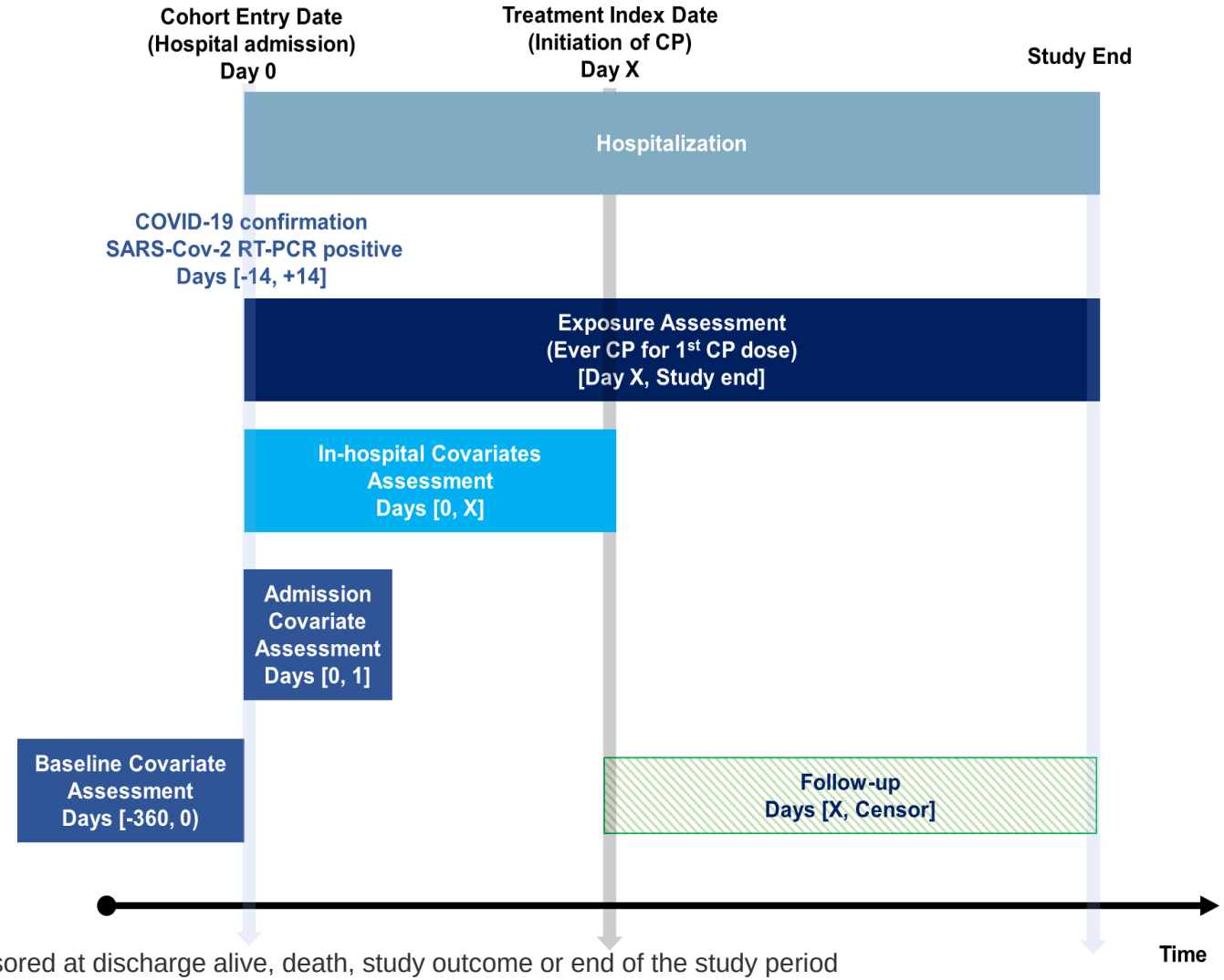
Effectiveness outcomes: 28-day in-patient mortality

Safety outcomes: Transfusion-related adverse events

COVID-19 Surveillance Activities

Anti-SARS-CoV2 Convalescent Plasma (CP) in Patients with COVID-19

Retrospective Cohort Study with Risk-set Sampling for CP Exposure



Censored at discharge alive, death, study outcome or end of the study period
Controls risk-set (1:2) matched on calendar time, duration from admission to CP, age and sex

COVID-19 Surveillance Activities

COVID-19 Vaccine Surveillance Preparation Master Study Protocol

Study Aim: To monitor the safety and effectiveness of COVID-19 vaccines

Study Population: 19-64 years old

Special populations include:

- Children
- Elderly: ≥ 65 years old
- Pregnant women
- Patients with select underlying condition
  - e.g., immunosuppression
- High risk populations
  - e.g., health care workers

Data Sources: Claims and EHR

COVID-19 Surveillance Activities

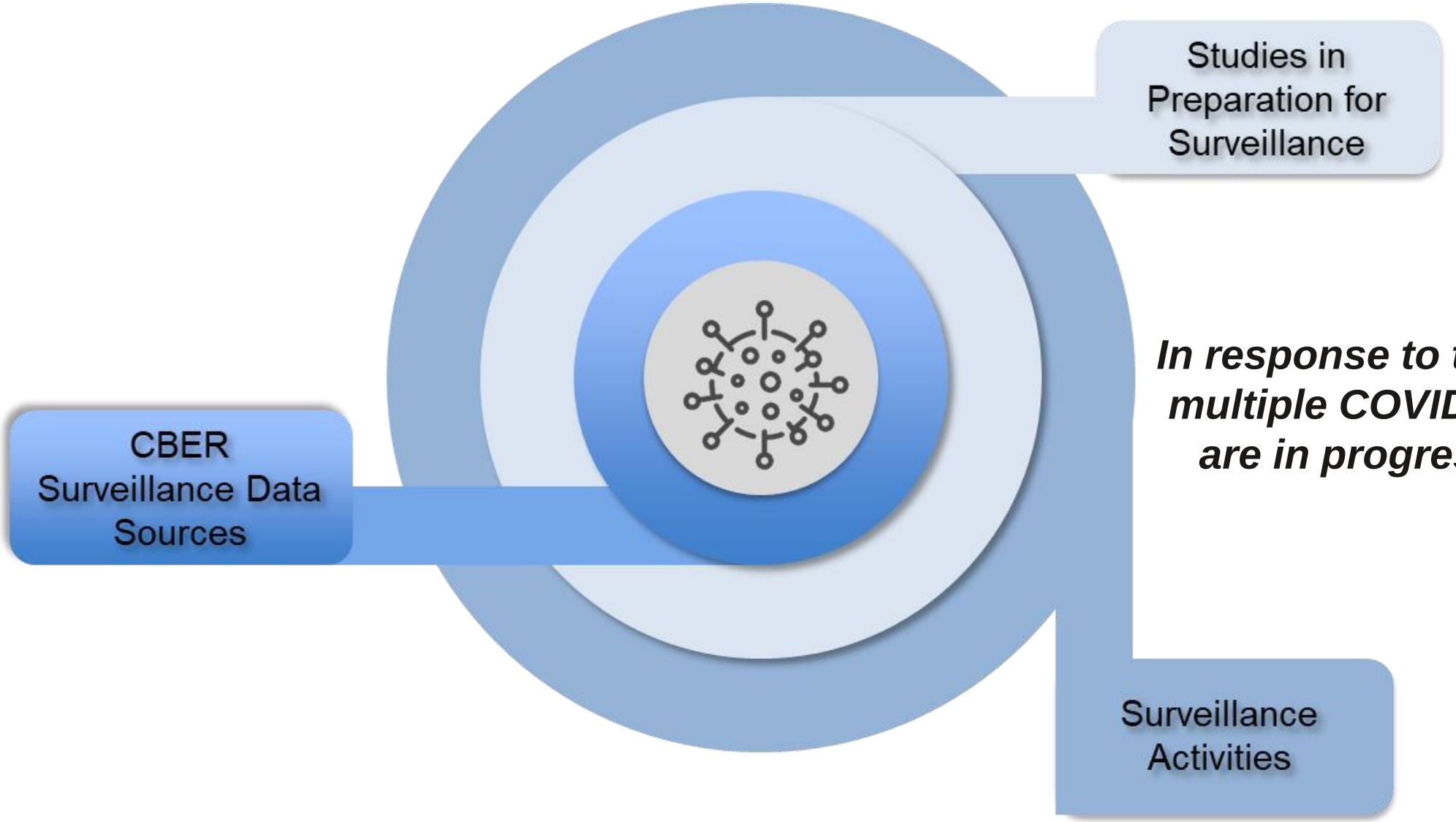
COVID-19 Vaccine Surveillance Preparation Master Study Protocol

Study Design:

- Safety
  - Signal detection: sequential analysis
  - Signal evaluation: cohort & self-controlled

- Effectiveness

Summary



In response to the pandemic, multiple COVID-19 activities are in progress at CBER.

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Session III — Audience Q&A

Leveraging the Sentinel Initiative for COVID-19

RWE and Sentinel: Past, Present, and Future. A Fireside Chat with Amy Abernethy.

3:30 pm – 3:55 pm

Closing Remarks

Mark McClellan

Duke-Margolis Center for Health Policy

Thank You!

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